Les leviers de l'action de l'entrepreneur institutionnel: le cas des micro et nanotechnologies et du pôle de grenoble

Aurélie Delemarle

Ecole Nationale des Ponts et Chaussées

Laboratoire Techniques, Territoires et Sociétés

Ecole Doctorale Entreprise, Travail, Emploi

LES LEVIERS DE L'ACTION DE L'ENTREPRENEUR INSTITUTIONNEL : LE CAS DES MICRO ET NANOTECHNOLOGIES ET DU POLE DE GRENOBLE

Thèse présentée par

Aurélie DELEMARLE

En vue de l'obtention du doctorat en Sciences de Gestion

Thèse dirigée par Philippe LAREDO

6 Février 2007

Membres du Jury :
Pierre – Jean BENGHOZI, Professeur à l'Ecole Polytechnique
Rodolphe DURAND, Professeur à l'Ecole des Hautes Etudes Commerciales, Rapporteur
Isabelle HUAULT, Professeur à l'Université Paris Dauphine, Rapporteur
Philippe LAREDO, Professeur à l'Université de Manchester et Directeur de Recherche à l'Ecole Nationale des Ponts et Chaussées, Directeur de thèse
Vincent MANGEMATIN, Directeur de Recherche à l'Institut National de la Recherche Agronomique

Les propos ici tenus n'engagent que son auteur.

Remerciements

Cette thèse est le résultat de multiples interactions développées et entretenues au cours de ces trois années.

Je remercie tout d'abord Philippe Larédo qui a su me guider, tout en me laissant maître de tous mes choix, dans l'apprentissage du métier de chercheur. Plus, son enthousiasme dans l'exploration de sujets de recherches est communicatif ce qui est, et a été, primordial dans l'achèvement de ce travail, dans la mise en œuvre de nouveaux projets, et dans la vision ambitieuse des métiers de la recherche.

Vincent Mangematin m'a apporté une facette complémentaire du chercheur en apportant, toujours à bon escient et de bonne humeur, suggestions de lecture, rigueur et suivi des objectifs. J'ai beaucoup appris au gré de nos collaborations.

Cette thèse n'aurait pas eu lieu sans l'accès que Jean Therme m'a autorisé sur le site du CEA-Grenoble et dans ses archives en particulier. Il a été de plus un lecteur ouvert, attentif et critique aux articles qui composent cette thèse et les a commentés en détail pour souligner toute inexactitude. Laurence Nisin, Florence Cristallini, Dominique Grand et Marie-Claude Réolon ont également été des interlocuteurs toujours généreux de leurs temps et de leurs conseils.

Catherine Paradeise, Charles Dhanaraj, Alexandre Mathieu Fritz, Peter Weingart, Bernard Kahane, Gilles Crague, Patrice Flichy, Arie Rip, Peter Karnoe ou Ashveen Peerbaye ont plus particulièrement contribué à la réflexion sur cette thèse ou à sa rédaction en en commentant des versions préliminaires. D'autres collègues, tout particulièrement Elodie Brulé et Jakominj, ont participé aux développements des arguments.

Plus globalement l'ambiance de l'équipe TIO a facilité ce travail de thèse en faisant du Bois de l'Etang un lieu de travail agréable mais studieux.

Enfin je remercie mon père et ma sœur, Marie qui ont pris de leur temps pour relire ces chapitres en français ainsi que Jean Sutcliff et Harriet Bigas pour avoir corrigé, pendant de longues heures, les chapitres en anglais. Merci à Thibaut et à tous ceux qui m'ont apporté leur support quasi-indéfectible dans cette aventure, particulièrement à mes parents à qui cette thèse est dédiée.

Sommaire

Liste des tables et figures

Introduction

Chapitre 1

Chapitre 3

Chapitre 4

Chapitre 5

Chapitre 6

Chapitre 7

Introduction générale

- *152,45 millions d'investissement dont 64% financés par les collectivités locales et territoriales*
- *44000 m² de nouveaux bâtiments*
- *3500 personnes*
- *40 laboratoires*
- *1er centre européen pour les micro et nanotechnologies*
- *1ère fois en France que sont réunis sur un même site tous les acteurs du domaine: étudiants, chercheurs et industriels*
- *Du micromètre (soit 0,0000001 mètre) au nanomètre (soit 0,000000001 mètre)*
- *6 ans de travail de 2000 à 2006*

Ces chiffres sont issus du document de présentation de Minatec, lors de son inauguration, en septembre 2006, à Grenoble. Ils témoignent du gigantisme du projet et de l'ampleur du travail qui a été nécessaire pour y aboutir. Car, dans le paysage français, tout étonne dans ces chiffres : la taille des installations, le nombre de personnes y travaillant, la part financée par les collectivités locales et territoriales, la réunion sur le même site de l'ensemble des acteurs du domaine.

Enfin, tout étonnait, car la politique des pôles de compétitivité lancée en 2005 par le gouvernement français a pu rendre ces chiffres davantage banals pour le lecteur de 2006. Néanmoins, il convient de se remettre dans les conditions de ce début de siècle. Larédo et Mustar constataient, en 2002, que le contexte de l'innovation et de la recherche, notamment en matière d'organisation et de politiques publiques, avait beaucoup changé en dix ans. Au centre des transformations se trouvaient notamment :

- un redéploiement des technologies de pointe (du nucléaire aux nanotechnologies par exemple) : celles-ci existent toujours, mais nécessitent une approche différente dans leur gestion et leur développement ;
- une intensification en R&D dans de nombreux secteurs, y compris dans des domaines plus traditionnels ;
- le rôle central que les PME ont joué et jouent dans le cadre du dynamisme régional mobilisant l'attention des politiques,
- l'importance des universités et de la recherche publique dans la création et la circulation des connaissances et leur implication croissante avec les milieux industriels ;
- une recherche construite principalement autour de projets autres que militaires.

A ces bouleversements, il convient alors d'ajouter un autre constat : les activités liées à la recherche se globalisent et les multinationales ne s'attachent plus à une étiquette nationale d'une part, tandis que, d'autre part, les PME et les universités font preuve d'un grand dynamisme et d'une grande capacité d'attraction au niveau local.

Enfin, le développement d'un nouveau genre de sciences et de technologies, les « nouvelles sciences dominantes » (Bonaccorci, 2004) remettait en cause les modèles

d'innovation précédents ; les relations entre acteurs, les structures organisationnelles et géographiques, les politiques publiques devaient s'adapter aux challenges posés par ces « nouvelles sciences dominantes ».

C'est dans le contexte de ces transformations que Minatec est né. D'ailleurs, Minatec n'est pas un exemple isolé puisque, à travers le monde, d'autres efforts ont été réalisés pour mettre en place de nouvelles formes de collaborations entre les acteurs de la micro-électronique. Avec le changement d'échelle du micromètre au nanomètre (nm), tous les acteurs du monde de l'électronique - appelée filière, nous y reviendrons - sont concernés : industriels, autorités publiques et universités. L'encadré 1 atteste de cette tendance de fond dans les plus importants centres de microélectronique au niveau mondial. Ces nouvelles formes de collaborations scientifiques et technologiques impliquent une dimension spatiale forte comme en témoignent les situations prises en exemple : les mots de pôle, centre ou la référence à la Silicon Valley illustrent cet aspect.

Encadré 1 Revue des évolutions organisationnelles dans les plus grands centres de microélectronique au niveau mondial (extraits de presse ou de rapports)

***UCLA Chosen to Lead Nano-Manufacturing Research Center** (2003).The National Science Foundation has awarded UCLA a grant worth nearly $18 million over five years to establish a new Nanoscale Science and Engineering Center. The new center will combine fundamental science and technology in nano-manufacturing that will transform laboratory science into industrial applications in nano-electronics and biomedicine. […] "The awarding of these centers represents a remarkable concentration of new technology and enterprise on the UCLA campus," said Vijay Dhir, dean of UCLA's School of Engineering. "Collectively they will have a profound impact on technology and business in Southern California."*

http://newsroom.ucla.edu/page.asp?RelNum=4601&menu=fullsearchresults

*Semiconductor manufacturing in Germany's **Silicon Saxony**, located in Dresden. The German government announced this week that it is in advanced talks with several companies and organizations in the Dresden area in hopes of creating the center in the capital of the eastern federal state of Saxony' Small Times, 2006*

*Governor George E. Pataki today [February 28th, 2003] announced that International SEMATECH -- a consortium of the 12 major computer chip manufacturers in the world -- will site its next generation 300 millimeter computer chip research and development center, to be called International SEMATECH North, at the **Center of Excellence in Nanoelectronics at the University at Albany**.*

http://www.gorr.state.ny.us/01_28_03_sematech.htm

*Leading **Nanoelectronics Research Center** in Japan – Nanoelectronics Collaborative Research Center, University Japan has been investing heavily in nanoelectronics R&D for the last over a decade. In additional to the billion dollar investment by the Ministry of Economy, Trade and Industry (METI) to the consortium of large electronic corporations in Japan since, special programs have been designed to enhance industry and university cooperation for long and medium term research and development. The Nanoelectronics Collaborative Research Center (NCRC) established in Feb. 2002 has been designed for such purpose.*

http://www.nanoworld.jp/apnw/articles/japan.php

The Committee's recommendations outline a series of modest steps that nonetheless may prove important to the long-term welfare, economic growth, and security of the United States. Resources for University-

based Semiconductor Research to better address the technical challenges faced by the semiconductor industry and to better ensure the foundation for continued progress, more resources for university-based research are required.
The Committee believes that universities have an important role in maintaining a balance between applied science and fundamental research. This balance is key in generating ideas for future research.
The Committee suggests consideration of the development of ***three-way partnerships among industry, academia, and government*** *to catalyze progress in the high-cost area of future process and design. These partnerships would:*
a. Sponsor more initiatives that encourage collaboration between universities and industry,
b. Increase funding for current programs.
c. Create Incentives for students.
Charles W. Wessner, 2003: 4-5

Ces interprétations n'expliquent néanmoins pas comment localement les acteurs de l'industrie de la microélectronique se sont organisés pour prendre en considération les transformations à l'œuvre. Ce sera l'objet principal de cette thèse, qui prendra pour niveau d'analyse les acteurs grenoblois et comme point de départ leur vision de l'industrie de la microélectronique.

Néanmoins, avant de se focaliser sur ces questions, il convient d'expliciter quelque peu les sciences et technologies qui sous tendent ces transformations de l'industrie. Nous avons en effet cité le terme de « nouvelles sciences dominantes » précédemment. Nous nous attachons donc dans une première partie à préciser le contexte de la micro et nanoélectronique qui en est un exemple. Ces considérations ne sont pas superflues ; elles mettront en avant la relation entre espace et innovation qui sera l'objet de la deuxième partie. Sur ces bases, la problématique sera présentée, suivie du plan général de la thèse.

1 Introduction à l'industrie de la micro-électronique

L'industrie de la micro-électronique s'organise autour de la notion de « filière », non pas dans le sens qu'en donnent les économistes des années 80 (e.g. Dunford, 1988), mais dans celui d'un ensemble de technologies cohérentes et coordonnées autour d'un standard et qui permettent de produire une série d'innovations (e.g. Luryi et al., 1999). Pour mieux en comprendre la définition, il convient de détailler les objets techniques qui la composent.

Les circuits électroniques sont actuellement composés de milliards d'éléments électroniques, les transistors, qui constituent la base du circuit. Les premiers circuits électroniques étaient composés de tubes à vide. Sous la pression des applications, ceux-ci évoluèrent pour d'abord nécessiter des niveaux de consommation énergétique plus faibles ce qui mena à l'apparition des circuits dits solides, parce qu'ils offrent des caractéristiques de faible dispersion du courant. Réclamant une plus forte intégration (*i.e.* des éléments plus petits), la technologie silicium émergea alors car le silicium est un matériau « facile à travailler » ; des besoins croissants en intégration, en vitesse et en faible consommation,

poussèrent les développements et renforcèrent la technologie silicium également appelée CMOS* (Complementary Metal Oxyde Semiconductor[1]). Aujourd'hui celle-ci s'est totalement imposée et a détrôné dans les années 90 d'autres technologies[2] qui ne subsistent que dans des applications de niches. Cette concurrence a forcé la technologie CMOS à combiner des aspects de haute performance, haut niveau d'intégration et faible consommation. Cela lui a permis de développer des sous-spécialités[3], ce qui fait dire aux ingénieurs qu'elle est multiple : elle regroupe un grand nombre d'architectures* dont seulement quelques phases du processus de fabrication varient. En plus de ces attributs techniques, la technologie s'est vue renforcée par des barrières à l'entrée : coût élevé des infrastructures de production, des équipements de fabrication et aussi du design* des circuits et systèmes.

En microélectronique, les principaux éléments de base concernent les mémoires (DRAM*), les processeurs (MPU*), et les logiciels de gestion spécialisés (ASIC*) : ce sont les produits de la microélectronique qui sont utilisés pour une grande variété d'applications tels que l'électronique grand public, la téléphonie, l'informatique etc. Croiser ces éléments de base avec les procédés technologiques du CMOS permet d'obtenir une multitude de couples produits/process. Chacun de ces couples est la plus petite entité constituant une filière dans l'industrie. La filière à proprement parler est donc l'ensemble des couples produits/process qui assurent la réalisation d'une génération de puces (*e.g.* Pentium III, IV etc.). Ce concept renvoie au fait que chaque génération est organisée autour d'un standard, qui permet aux acteurs de s'aligner. La génération, par la standardisation qu'elle impose, permet aux acteurs de l'industrie de la microélectronique de se synchroniser, et ainsi de réduire les temps de cycles d'innovation. La coordination est assurée, depuis 1992, par la publication d'un document, la roadmap, définissant les cibles successives à atteindre (ces cibles représenteront les générations). Y sont détaillés tous les éléments techniques, des paramètres structurels des objets à la performance du système pour les mémoires. C'est l'International Technology Roadmap for Semiconductors (ITRS), collège de 850 experts internationaux, qui assure cette fonction laquelle l'était auparavant par la loi de Moore* (depuis 1977), dont elle s'inspire largement.

La coordination est centrale dans l'industrie de la microélectronique tellement le passage d'une génération à l'autre demande des investissements[4]; prenons comme exemple l'adaptation nécessaire des outils de gravure (les transistors sont gravés sur des plaques de silicium). Lorsque la longueur de grille* passe de 130 nanomètres (nm) à 90 nm, il est nécessaire de changer de technique car la première technique est trop grossière pour graver des lignes de quelques nanomètres de largeur. C'est ainsi qu'il a fallu passer des

[1] Un glossaire reprend l'ensemble des termes techniques utiles et abréviations en fin de volume. Les termes qui y sont inclus sont indiqués par un astérisque.
[2] le transistor silicium bi-polaire ou les technologies dites III-V
[3] C-MOS, n-MOS, pMOS, bi-MOS
[4] Les microélectroniciens estiment qu'au total un tiers des compétences de la filière doit être renouvelé à chaque passage de générations.

techniques de projection laser (*i.e.* plusieurs centaines d'électrons projetés à la fois) à des techniques de projection d'un seul électron (E-beam*). Mais le saut technologique d'une méthode à l'autre est considérable, en temps et en investissements physiques car il faut d'abord pouvoir canaliser le flux d'un seul électron. Ensuite, pour graver une plaque de silicium, il convient de balayer toute la surface de la puce « ligne par ligne » alors que précédemment, la plaque était gravée[5] entièrement en une fois. Il est donc indispensable aux fabricants d'outils de lithographie d'anticiper ces problèmes pour pouvoir fournir à temps les technologies nécessaires aux autres membres de la filière.

Ceci n'est qu'un exemple qui démontre le poids de l'investissement à réaliser pour passer à une nouvelle génération, mais il faut savoir qu'il concerne en fait toute la chaîne de valeur :

- les équipementiers ; ces-derniers doivent pouvoir disposer de techniques de lithographie à différentes échelles pour de déposer tel ou tel dopant*, résine ou isolant (les méthodes de dépôt sont à définir ainsi que le choix du dopant, de l'isolant ou de la résine elle-même) ;
- les fabricants de matériaux (plaques de silicium ou matériaux pour la réalisation des circuits) ;
- les designers et concepteurs dont les outils de simulation doivent être mis à jour (ils doivent être capables de prédire le comportement de tel ou tel composant en utilisant tel ou tel matériau) ;
- les ingénieurs travaillant sur les éléments de packaging doivent intégrer les contraintes liées aux composants utilisés pour la fabrication et les éventuels effets d'échelle ;
- etc.

Malgré les contraintes posées à la technologie CMOS par la réduction en taille des composants, l'industrie considère son futur au travers du CMOS : sa grande force réside dans sa flexibilité et le transistor CMOS est considéré comme l'interrupteur quasi idéal, car il ne retient qu'une quantité de courant négligeable lors du passage de celui-ci, et qu'il peut être utilisé indifféremment en série ou en parallèle. La technologie continue même à grignoter du terrain à ses concurrentes étant donnés les investissements qui sont dévolus à l'amélioration de ses performances. Si les effets de réduction d'échelle lors du passage au nanomètre peuvent rendre le CMOS moins attractif, les spécialistes préfèrent aborder le problème différemment : la question d'augmenter le nombre de transistors sur une puce (intégration) n'est plus forcément la plus importante, mais elle concerne davantage la façon de les utiliser au mieux en fonction des contraintes de consommation. Pour traduire ces changements de préoccupation, les critères de performances commencent à ne plus être centrés sur un processeur mais sur un ensemble de processeurs[6]: monter ces éléments

[5] Le terme technique est « insolée »

[6] La tendance est de prendre des critères de performance pour la puce entière et non plus sur les éléments la composant.

en parallèle améliore les performances et permet de continuer à utiliser les technologies CMOS.

Des domaines de recherche se développent cependant pour remplacer la filière silicium sous le nom de technologies « post-CMOS* » ou « beyond-CMOS* » incluant des candidats tels que les nanotubes de carbone* et les nanofils*, l'électronique moléculaire* et les logiques à un électron* et superconducteurs*.

Transformations du secteur de la microélectronique et impacts sur l'organisation : le centre d'intégration [7]

Le passage d'une génération à une autre est actuellement d'environ 18 mois, mais cette tendance s'accélère encore alors que dans les années 90, il était de 24 mois. Ce qui signifie que les temps de cycle entre la recherche et la mise sur le marché des innovations sont très courts. Les conséquences au niveau de l'organisation de l'industrie sont lourdes. En effet, comme cela a déjà été précisé, les connaissances pour passer d'une génération à l'autre doivent être renouvelées d'environ un tiers tous les 18 mois ce qui implique, d'une part, une force de recherche importante, et d'autre part, une ouverture aux domaines amont plus grande pour anticiper les générations futures. La proximité des acteurs est ici un atout majeur. Cet aspect tend à favoriser le développement de « labfab » c'est à dire de laboratoire/lieu de fabrication qui permettent l'utilisation des mêmes équipements et procédés pour la recherche et la fabrication, autorisant ainsi un passage plus rapide entre les stades de recherche, de développement et de production.
Enfin, considérant le point précédemment développé sur le recentrage du CMOS sur les aspects d'architecture de circuits, il est également très important que les fonctions de design et conception soient désormais davantage intégrées en amont de la position qu'elles occupaient jusqu'à présent dans la chaîne et qu'elles n'en soient plus séparées.

Les bases de connaissances des acteurs doivent donc s'étoffer en nombre de domaines couverts (*breadth)* tout en développant des connaissances très pointues *(depth)* pour anticiper le développement des générations futures. C'est dans ce contexte que l'intégration de cette diversité de connaissances est capitale. Le « labfab » n'est alors plus seulement le laboratoire/lieu de fabrication qui fut décrit précédemment mais il devient le cœur du système car lieu où *breadth* et *depth* peuvent se combiner, s'intégrer pour donner naissance à ce qui est appelé « démonstrateur ». Celui-ci est la réalisation physique, en un objet ayant certaines fonctionnalités escomptées, de plusieurs concepts théoriques qui individuellement fonctionnent mais dont l'intégration n'a jamais été réalisée dans un

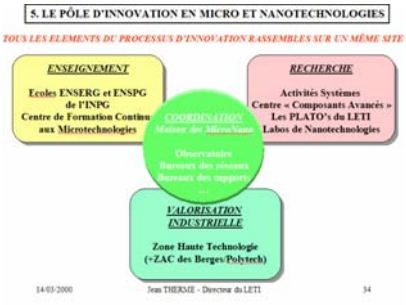
[7] Ceci résulte d'avis d'experts et d'acteurs de la micro-électronique qui furent recueillis et interprétés par Ph. Larédo et B. Kahane. Ils sont repris ici car ils illustrent la relation entre développement d'innovations et territoire au travers du terme « centre d'intégration »

système fonctionnant véritablement[8]. Le démonstrateur se tient à la frontière floue entre exploration et exploitation.

C'est ainsi que l'aspect d'intégrateur d'un centre de recherche est devenu essentiel pour la survie de toute une série d'acteurs liés entre eux. Cette tendance s'est renforcée au cours de la dernière décennie et là où on comptait 4 ou 5 centres intégrateurs en France, la masse des investissements nécessaires en hommes et en équipements a réduit ce chiffre à 1. C'est ainsi que le LAAS[9] de Toulouse, premier laboratoire français à développer la technologie à la base du transistor CMOS, s'est retiré de la microélectronique pour se concentrer sur d'autres aspects, ne pouvant suivre le niveau d'investissement requis pour rester dans la course[10]. Le Léti du CEA[11] joue aujourd'hui le rôle de centre d'intégration. A l'échelle mondiale, la même tendance est à l'œuvre : les concentrations se renforcent en microélectronique autour de quelques centres IMEC en Flandres, Dresden en Allemagne, AlbanyTech et CNSI aux Etats-Unis pour ne citer que les plus importants.

Cette description des transformations met en exergue la nécessité de regrouper sur le même site tous les acteurs de la filière (Images 1) : universités (recherche fondamentale et formation) ; centres de recherche appliquée (qui se saisissent des briques de base) ; industries (qui valorisent les technologies au travers de produits).

Images 1 Trois exemples de nouvel agencement d'acteurs de la micro-électronique : Minatec à Grenoble, AlbanyTech à New York et le pôle de compétitivité Eindhoven-Leuven à la frontière belgo-neérlando-allemande.



Ces trois exemples témoignent des nouveaux agencements d'acteurs édifiés dans le but de permettre à des innovations en micro et nanoélectronique de se déployer. Ils posent la question du changement institutionnel. En effet, face aux dynamiques des nanosciences et des nanotechnologies, les paragraphes précédents ont mis en avant les transformations dans les relations entre acteurs, dans leurs façons de travailler et de collaborer. Ainsi, le passage à l'échelle du nanomètre implique des transformations dans les espaces cognitifs

[8] P.Larédo et A.Delemarle, Atbest WP3, 2005
[9] Laboratoire d'Analyse et d'Architecture des Systèmes
[10] A noter que la région de Toulouse ne compte pas d'équivalent à ST ou Philips pour le soutenir.
[11] Le CEA est le Commissariat à l'Énergie Atomique. Le Léti est le Laboratoire d'electronique, de technologie et d'instrumentation

des acteurs (inter-pénétration des domaines de la physique, de la chimie, de la biologie et de l'informatique par exemple), des changements dans leurs modes de régulation (partage de la propriété intellectuelle dans des accords de collaborations précompétitifs) et dans les normes (interdépendance des acteurs et travail autour des plateformes par exemple) qui régissent l'industrie de la microélectronique. C'est pourquoi le concept d'institution est approprié pour expliquer la nature des transformations à l'œuvre. Quelle que soit la définition du terme employée, la notion d'institution est ici pertinente, que ce soit comme modèle mental partagé (North, 1990), comme règle du jeu (Powell et DiMaggio, 1991), comme étant comprise comme acquise (Berger et Luckman, 1967) ou comme, dans sa définition la plus générale :

> « Institutions consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behaviour. Various carriers – cultures, structures, and routines – transport institutions and they operate at multiple levels of jurisdiction » (Scott, 1995 :33) .

2 Positionnement : une thèse sur l'entrepreneur institutionnel

La question est donc, en considérant le poids que les institutions imposent sur les agents d'une part et les remises en question que la promotion d'innovations de rupture impose[12] d'autre part, de comprendre comment des acteurs peuvent rompre le carcan qui les contraint[13] et se réorganiser jusqu'à créer une nouvelle institution ou à en transformer une existante. Ce qui importe ici n'est pas tant le paradoxe que représente un acteur se libérant du poids de la structure ; nous l'acceptons et n'avons pas la prétention de pouvoir le résoudre. Néanmoins, nous souhaitons contribuer au débat qui existe dans le domaine, en nous fondant sur la littérature existante, mais en nous positionnant sous un angle différent. Trois éléments sont à l'origine de cette volonté :

- En premier lieu, les recherches institutionnelles, mettant en scène la création ou la transformation d'une institution, s'attachent à une seule des deux dimensions temporelle ou spatiale ; la double gestion de ces dimensions n'y est pas présente. Le rôle de la roadmap précédemment citée comme coordinateur des activités dans le temps et les transformations géographiques en cours soulignent le besoin de trouver une approche capable de concilier les deux.

- En deuxième lieu, on remarque que ce sont des « types de stratégie » du changement institutionnel qui sont présentés dans la littérature, plus que le détail de leur mise en œuvre, ce qui en conséquence, en réduit la complexité.

[12] Nous ne détaillons pas ici les littératures de gestion, d'économie ou de sociologie sur la difficulté pour les acteurs de mettre en place des structures ayant pour but de promouvoir le développement d'innovation de rupture. Pour références et au titre d'exemples, nous pouvons citer ici Christensen (1997), Abernathy et Clark (1985), Bower et Christensen (1995) ou Collarelli et Rice (2001) pour la gestion ; Stankiewicz (2000) pour la sociologie ; Dosi (1982) pour l'économie.

[13] Cette question est au centre des théories institutionnelles, nous y reviendrons dans le Chapitre 2 qui en présente un état de l'art.

Pourtant, certains auteurs (*e.g.* Lawrence et Suddaby, 2006) appellent à plus d'attention au travail institutionnel en tant que tel faisant référence à des travaux en sociologie ou en ethnographie comme pistes de réflexion.

- Enfin, et son influence n'est pas des moindres, le contexte de la thèse joue un rôle important. Elle était, en effet, attachée à un programme multipartenaires[14] sur les nanotechnologies et focalisée sur l'émergence de Minatec, pôle européen d'innovation en micro et nanotechnologies situé à Grenoble. Les entretiens préliminaires ont unanimement mis en avant le rôle d'un acteur central, Jean Therme, dans les transformations organisationnelles et institutionnelles à l'œuvre. Les premières recherches dans les archives sur place ont permis, en plus du recueil des données, d'observer le travail au jour le jour de cet acteur.

C'est à la confluence de ces trois éléments que cette thèse s'articule. La notion d'entrepreneur institutionnel (cf Chapitre 2) permet de les prendre en compte et elle est donc choisie comme base pour la réflexion globale : en effet, dans sa définition générale, l'entrepreneur institutionnel est un agent qui mobilise ressources et supports dans le but de transformer une institution ou d'en créer une nouvelle (Maguire et al., 2004 ; DiMaggio, 1988). Cette approche est utilisée dans le but de comprendre comment le pôle Grenoblois en micro et nanotechnologies s'est construit en prenant en compte les spécificités liées aux sciences et technologies sous jacentes au pôle.

Ce travail s'inscrit donc dans la lignée des travaux de Bruno Latour (1987, 1988) qui interroge le lecteur sur les « choses en train de se faire » plutôt que l'objet final en lui-même : plus que de comparer deux états séparés dans le temps et de trouver une explication du changement dans la réalisation réussie d'une stratégie par un acteur ou un groupe d'acteurs, Latour nous interpelle sur les micro-processus qui au jour le jour ont permis le passage de l'un à l'autre. Mintzberg se pose les mêmes questions lorsqu'il s'attache au travail des managers (1990). Tous deux nous invitent à considérer des pratiques quotidiennes qui relèvent des mécanismes de fonctionnement des acteurs.

Il s'agit alors de proposer **une plongée dans le travail au quotidien de construction d'une institution (supportant la restructuration d'un espace géographique) en s'intéressant aux leviers de l'action d'un acteur central (l'entrepreneur institutionnel) pour enrôler ressources et supports autour de son projet (la création ou la transformation d'une institution).**

[14] Le projet de recherche est en effet encastré dans le cadre d'un contrat de recherche avec le CEA-Grenoble regroupant des gestionnaires et sociologues du LATTS/ENPC (Ph. Larédo et B. Kahane), de l'Université Pierre Mendès France de Grenoble (V.Mangematin et C. Genet à GAEL et D. Vinck au CRISTO) et de l'Ecole de Management de Grenoble (S. Blanco).

3 Apports et contributions

D'un point de vue théorique, l'analyse s'attache à éclairer des processus souvent cachés, et à rendre compte de leur complexité. Les stratégies des acteurs ne sont pas forcément nouvelles et ont été décrites dans la littérature mais les processus de leur construction et de leur mise en œuvre n'ont pas été l'objet de recherches jusqu'à présent, du moins dans le domaine des théories institutionnelles. L'importance du discours dans la transmission de la vision de l'organisation de l'industrie (l'institution) n'est plus à démontrer mais sa construction, le processus de mobilisation d'un point de vue pratique offrent des voies de recherche peu explorées pour le moment. Cela s'explique en bonne part par la difficulté pratique du suivi des processus en question au jour le jour. En effet, les recherches sur les stratégies de construction d'une institution sont d'un caractère postérieur à leur mise en œuvre ce qui constitue un fait rédhibitoire pour leur reconstruction ex-post. Ce n'est que sur base d'archives complètes, capables de retracer l'ensemble du phénomène complexe qu'est l'émergence d'une institution impliquant plusieurs niveaux d'analyse, que ce travail est concevable. L'accès unique aux archives et aux acteurs impliqués nous a offert les conditions nécessaires pour le suivi de la construction de l'institution. De plus l'arrivée sur le site alors que les changements étaient en cours nous a permis d'intégrer l'observation des pratiques de l'acteur central.

Les principaux apports de la thèse portent, dans cet ordre, sur trois points. En nous basant sur l'évolution du discours de l'entrepreneur institutionnel et en le confrontant à la réalité de la construction de l'institution, nous analysons les mécanismes de construction et de renforcement de la légitimité au travers de l'utilisation de tests (Chapitre 5). Nous montrons que différents tests sont organisés (mais qu'ils ne peuvent être planifiés) par l'entrepreneur institutionnel et qu'ils permettent à sa vision de gagner en légitimité et à son projet institutionnel de se construire par étape.

Nous nous attachons ensuite aux pratiques permettant la mobilisation durable d'acteurs hétérogènes (Chapitre 6). Nous insistons sur la construction de réseaux séparés d'acteurs (le réseau global et le réseau local) et sur la nécessité de prendre en considération le poids de l'environnement général du projet. Les supports sont donc identifiés, sélectionnés et se voient attribuer un rôle par l'entrepreneur institutionnel en fonction de sa vision des mondes futurs.

Enfin, sur base d'observations, nous nous intéressons aux pratiques qui sous-tendent la constitution d'un discours qui se veut performatif (Chapitre 7). Il s'avère que la création d'un dialogue dans la durée est fondamentale pour l'entrepreneur institutionnel et que pour y parvenir, il développe une infrastructure dont le but est de produire son discours (la fabrique des transparents), de le transmettre et le relayer (les multiplicateurs et les duplicateurs). Ainsi la construction quasi taylorienne des transparents des présentations ou l'utilisation de l'équipe projet Minatec ou d'autres acteurs comme canaux de diffusion du discours traduisent l'entreprise que construit J.Therme. L'entrepreneur institutionnel est donc avant tout un entrepreneur à la tête d'une entreprise dont « la raison sociale » est la construction et la diffusion de son message.

Les contributions ne sont cependant pas uniquement académiques. Nous tirons des leçons opérationnelles de ces recherches. Le cas de Grenoble regroupe en son sein un ensemble de traits qui mettent en avant des éléments utiles en matière d'organisation et de politiques publiques pour les processus d'innovation. Celles-ci ne sont cependant pas développées dans la thèse en tant que telle. D'une part, nous y trouvons des « leçons » pour la construction des pôles de compétitivité (Delemarle et Larédo, 2005). D'autre part, sont mises en exergue un ensemble d'éléments pratiques pour la promotion d'innovation de rupture, c'est à dire la nécessité de constituer un cadre, ici nommé institution, pour aligner les acteurs (Delemarle, 2007).

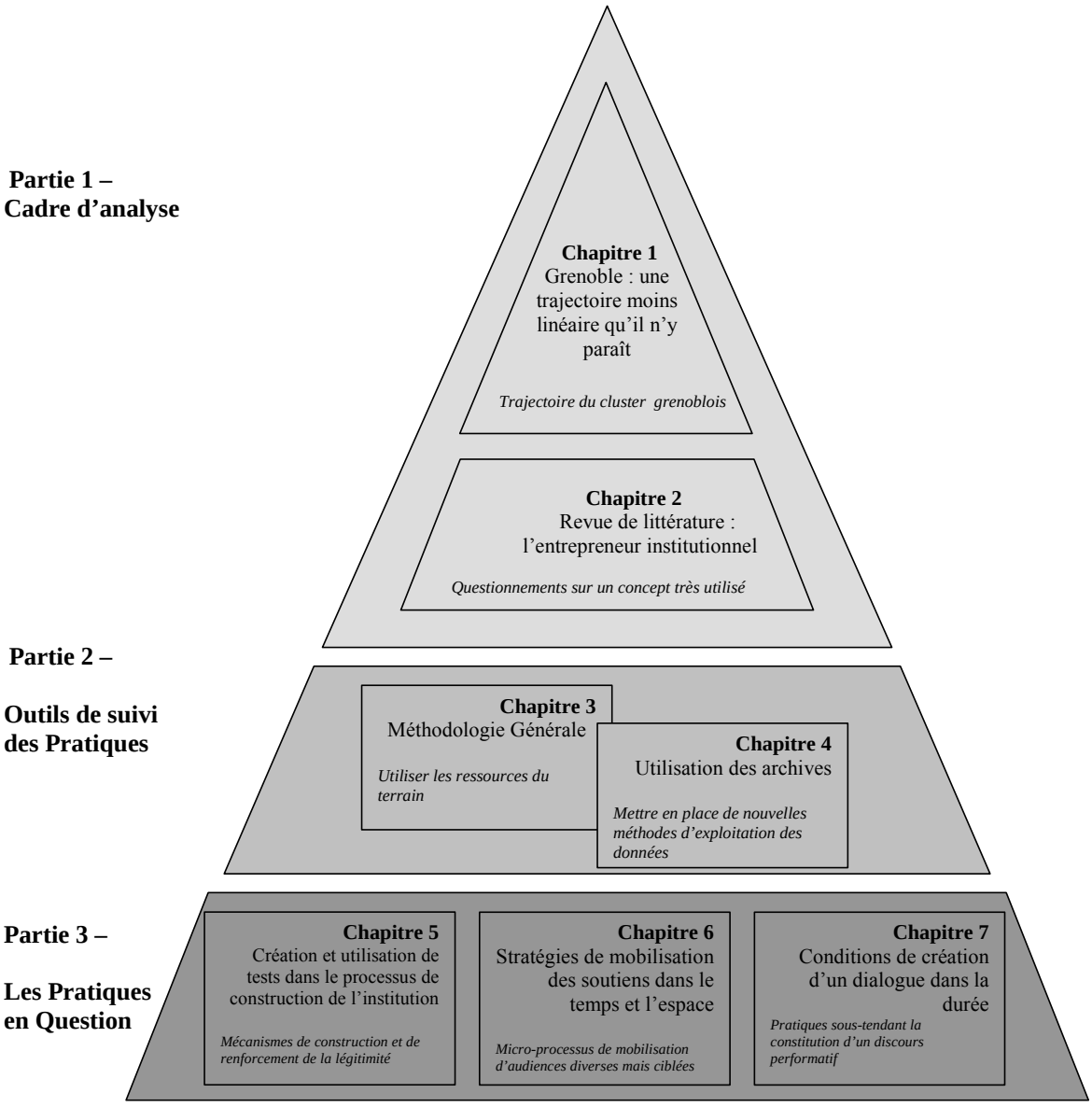
D'un point de vue méthodologique, le travail ici relaté propose également une approche originale. En effet, celui-ci se base sur un ensemble de méthodes classiques d'approche du terrain combinant entretiens semi-directifs, travail d'archives et observation. Cependant, la configuration du terrain est tout à fait particulière. Le fait que Jean Therme, directeur du CEA-Grenoble dispose de méthodes de travail[15] spécifiques est crucial. En effet, il ne produit pas de documents stratégiques au sens classique du terme, mais se base uniquement sur des présentations Powerpoint™[16]. Il a donc fallu s'adapter à cette particularité et mettre en place une méthodologie différente de suivi de la stratégie sur cette base. Pour ce faire, nous utilisons une méthode que nous appelons « la vie des transparents » pour repérer les évolutions du projet, les moments de cristallisations, les différentes périodes de mobilisation etc.

4 Présentation et structure de la thèse

La structure de la thèse est classique (Schéma 1) mais un point central doit être mentionné : dans un but de valorisation de la thèse, quatre des chapitres sont écrits sous forme d'articles. Il s'agit des Chapitres 4, 5, 6 et 7. Ils sont écrits en anglais ainsi que la revue de littérature[17] (Chapitre 2). Chacun de ces chapitres peut donc être lu de façon indépendante du reste de la thèse, ce qui conduit à des redondances quant à l'exposition de la méthode (Chapitre 3) et à la revue de littérature (Chapitre 2). Pour garder une cohérence à la thèse, ces deux chapitres généraux ont été néanmoins conservés.

[15] Attention, ces méthodes ne trahissent pas une nouvelle façon générale de travailler pour les agents visant à promouvoir une nouvelle institution.
[16] Nous en avons d'ailleurs fait l'expérience nous même : ainsi, lors du contrat de recherche « MiNaTec » aucun rapport ne fur requis. Une présentation Powerpoint™ en présenta les résultats.
[17] La revue de littérature est écrite en anglais car les articles de référence sont écrits dans cette langue.

Schéma 1 Structure de la thèse



Une **première partie** pose les fondations de l'analyse. Le **Chapitre 1** oppose deux situations (deuxième moitié des années 90 à 2005) pour s'interroger sur le processus de passage de l'une à l'autre. Relié à la brève introduction à la microélectronique faite ci-avant, ce chapitre introduit le besoin pour la région grenobloise et ses acteurs de se réorganiser afin d'être en mesure de résister à la compétition mondiale et de profiter des promesses offertes par les nanotechnologies. La transformation que subit Grenoble est qualifiée de création de nouvelle institution car de nouvelles règles du jeu sont mises en place. En effet, les transformations n'introduisent pas seulement une ré-organisation des liaisons entre les acteurs mais induisent un changement plus profond dans les règles qui

régissent le collectif, les normes auxquelles les acteurs sont attachés et la culture qui les unit (Scott, 1995).

Dans le **deuxième Chapitre**, l'attention est plus spécifiquement portée sur l'entrepreneur institutionnel, terme générique pour parler de l'agent qui promeut la transformation ou la création d'une institution en mobilisant ressources et supports (DiMaggio, 1988 ; Maguire et al. 2002). La position d'entrepreneur institutionnel est ici attribuée à Jean Therme. Des chapitres d'ouvrage et articles clés de 1988 à 2006 sont employés pour établir un état de l'art. Ce-dernier est organisé autour de trois grandes questions sur les processus qui structurent la troisième partie de la thèse et qui seront une à une reprises dans les Chapitres 5, 6 et 7. La revue de littérature met en exergue un manque d'intérêt pour les pratiques de l'entrepreneur quant à mobiliser des ressources et supports, que ce soit par rapport à l'utilisation du discours (Chapitre 5), à la constitution des réseaux et au processus d'alignement des acteurs (Chapitre 6), ou à l'entreprise de fabrication et de diffusion du discours (Chapitre 7).

La **deuxième partie** présente les outils que le chercheur mobilise pour explorer le phénomène à l'étude. Le **Chapitre 3** détaille l'ensemble des techniques et des matériaux qui seront utilisés par la suite. Le **Chapitre 4** invite les chercheurs à développer des méthodes nouvelles d'exploitation des archives face aux usages avancés des nouvelles technologies.

Le cadre étant planté, la **troisième partie** s'attache aux détails de la construction de l'institution. Le **Chapitre 5** porte sur l'ensemble du processus de mobilisation et à la façon dont discours et légitimité sont liés. En se positionnant du point de vue du discours de l'entrepreneur institutionnel, nous nous intéressons aux tests dont Jean Therme ponctue son discours pour évaluer sa légitimité, la renforcer et progresser au fur et à mesure du temps. Le concept de narraction proposée par Kahane (2000, 2005) allié à la notion de confiance est utilisé comme ancrage théorique à partir duquel est élaborée une discussion autour des tests.

Les deux chapitres suivants se concentrent sur le processus de construction de l'institution en se focalisant sur la seule période d'émergence pour mieux analyser les pratiques de l'entrepreneur institutionnel.

Le **Chapitre 6** se construit autour des stratégies de mobilisation dans le temps et dans l'espace. Il met en lumière les séquences et les itérations entre groupes de supports qui la ponctuent sur base des travaux sur les réseaux de Callon (1991) et de Callon et Law (1988). Il en résulte notamment une re-définition des audiences mobilisés par rapport à la segmentation implicite habituelle interne/externe et une extension des travaux d'Aldrich et Fiol (1994). Sur cette base, l'étude de cas permet de mieux comprendre le rôle de l'entrepreneur institutionnel et son travail.

Le **septième et dernier chapitre** s'intéresse aux pratiques de l'entrepreneur institutionnel dans la construction d'un discours qui se veut performatif. Nous nous appuyons pour ce faire sur des théories d'analyse conversationnelle (*e.g*. Sacks, 1984 ; Schelgloff, 1968) et de la rhétorique (Perelman et Olbrechts-Tyteca, 1970). Globalement, le Chapitre 7 met donc en avant les conditions qui permettent au discours d'être performant au travers de la mise en place d'une infrastructure particulière.

En résumé, la thèse s'attache à qualifier l'entrepreneur institutionnel au travers de ses pratiques et à mesurer et quantifier son travail au travers de moments de cristallisation. Cet éclairage particulier porté au processus de création / transformation d'une institution se trouve en ligne directe avec les appels lancés par des chercheurs tels que Lawrence et Suddaby (2006) et, dans ce cadre, souhaite contribuer plus que par une « simple étude de cas » au champs de la gestion centré sur les théories institutionnelles.

Partie 1 – Cadre d’analyse

Chapitre 1 - Grenoble : une *Success Story* marquée par une récente rupture

1 Introduction

Ce premier chapitre a pour objet de planter le décor de la thèse[18]. Il n'a pas pour objectif de reconstruire l'histoire détaillée de Grenoble dans le domaine de l'électronique ni d'être exhaustif en matière d'acteurs présents localement, mais de présenter suffisamment d'éléments pour mettre en lumière les transformations à l'oeuvre.

L'histoire de Grenoble telle qu'elle est connue ressemble à une *success story* à la Silicon Valley ou à la Route 128 (Saxenian, 1994). Pourtant, et c'est ce que nous nous proposons d'exposer dans ce chapitre, cette aventure n'est pas tout à fait linéaire. Elle se construit d'abord dans la continuité de choix originaux effectués par les acteurs dans les années 60 et 70 jusqu'à la fin des années 90, puis se brise à l'aube du deuxième millénaire. L'histoire aurait pu ainsi se finir, le modèle existant venant à épuisement. Les acteurs reconnaissent se trouver face à un phénomène de « dépendance du sentier »[19]. Ce terme, emprunté aux économistes évolutionnistes, signifie que les acteurs, empêtrés sur un sentier, ne peuvent que continuer à faire ce qu'ils font déjà ou savent faire[20] (sauf au prix de coûteux efforts). Sur le long terme, ceci met en péril leur survie, à tel point qu'a même été envisagée la fermeture du laboratoire d'électronique du CEA, le Léti, cœur du développement en microélectronique de la région. Cependant, Grenoble montre en 2005 un dynamisme retrouvé, dont la structure est copiée, dans une certaine mesure, par d'autres régions à travers le monde[21]. La transition entre ces deux états est l'objet de ce chapitre.

Plutôt que de reprendre ces éléments dans une perspective purement historique, nous proposons un autre mode d'exposition du cas : dans une première partie nous nous appuierons sur les travaux concernant les systèmes localisés de production (Maillat, 1995 ; Carluer, 1999) ou les clusters (Saxenian, 1994 ; Porter, 1990) pour faire ressortir les indicateurs du succès grenoblois. Malgré ces éléments positifs, nous verrons ensuite

[18] Lorsque, initialement le travail de thèse commença en 2003, il ne nous fallut que peu de temps pour réaliser que l'organisation de la région grenobloise avait été profondément transformée, et, qu'un événement particulier avait fortement influencé cette tendance : la naissance de MiNaTec. Cependant, les transformations étaient toujours en cours. Nous étions donc des témoins privilégiés des transformations continues ; la structure de la thèse a pris corps sur la base des avancées. Bien que n'étant pas basée à Grenoble, nous bénéficions de longues périodes sur place lors des deux premières années de thèse ; la troisième année nous permit de prendre du recul. Notre quête de données s'achevait, comme toutes les pièces du puzzle grenoblois prenaient place. Les changements prirent une plus grande ampleur et furent visibles à l'échelle nationale et internationale au travers notamment d'articles de presse.

[19] Traduit de l'anglais *path-dependency*

[20] A priori, il n'y a là rien de problématique ; à l'exception de leur survie à plus ou moins long terme. La capacité à innover est fondamentale pour une entreprise – mais à innover pour rester devant ses concurrents. De nombreuses études (Chandler, 1992; Abernathy and Clark, 1985) ont démontré que les firmes déjà existantes sur un segment de marché avaient tendance à voir leur position remise en cause par de nouveaux venus, qui eux étaient davantage portés à innover de façon radical et remettre en cause l'équilibre existant.

[21] En effet, plusieurs centres de niveau mondial ont adopté la même structure (recherche/valorisation industrielle/formation) que Grenoble. Albany Tech au Etats-Unis s'est construit parallèlement à Grenoble, mais la restructuration de l'IMEC dans les Flandres et la constitution du centre de Dresde ont été influencés par le schéma grenoblois.

les traces de l'épuisement du système. La partie suivante présentera la réaction des acteurs face à cette situation et la nouvelle organisation du système.

2 Une *Success Story à la* Française

Le descriptif de la région de Grenoble s'articule donc autour de 5 indicateurs de succès relevés dans la littérature de l'économie géographique essentiellement. Les auteurs de ce champ mettent en avant dans leurs approches théoriques ou au travers d'études de cas, un ensemble de facteurs incontournables au succès des espaces géographiquement restreints. Si cette section se divise en cinq sous parties, présentant individuellement les éléments, les interactions (qui sont au cœur du système) entre chacun d'entre eux sont telles que des recouvrements sont inévitables.

2.1 Un degré de concentration élevé de firmes dans le domaine de la microélectronique

La concentration d'entreprises spécialisées contribuant à la fabrication d'un ensemble de produits est à la base de la notion du district. A Grenoble, la région se développe autour du concept de filière[22]. Celle-ci est un terme utilisé par les microélectroniciens qui regroupe « un ensemble de secteurs interdépendants dont l'origine remonte à un cœur d'innovations techniques communes (le transistor dans les années 40, les cartes de circuits imprimés dans les années 50, les circuits dits intégrés dans les années 60, l'intégration à grande échelle (LSI) dans les années 70, et l'intégration à très grande échelle (VLSI) et les fibres optiques aujourd'hui [dans les années 80] » (Dunford[23], 1988). Sont ainsi inclus dans cette définition, les acteurs travaillant dans la conception ou la production de composants électroniques, de biens d'équipements électroniques, d'ordinateurs ou outils de calculs, de logiciels, d'outils d'automatisation, ou d'électronique grand public.

Le phénomène de concentration d'entreprises autour de la filière à Grenoble est caractérisé par l'accumulation dans le temps de ces entreprises et par le fait que leur croissance est de caractère endogène.

[22] Une référence à la notion de filière a déjà été présentée dans l'introduction générale. Les éléments qui sont y présentés font référence à la situation des années 80 et du début des années 90 essentiellement, lorsque l'ITRS n'existait pas encore.

[23] Traduction personnelle de "[…] made up of a group interdependent and inter penetrating sectors whose origin lies in a sequence of technical innovations (the transistor in the 1940s, printed circuit boards in the 1950s, integrated circuits in the 1960s, large scale integration (LSI) in the 1970s, and very large scale integration (VLSI) and fibre optics at present [80s])"

- Une spécialisation résultant d'un processus d'accumulation historique, mais également de choix locaux effectués dans les années 60.

La spécialisation résulte d'un processus d'accumulation historique : à la sortie de la Seconde Guerre mondiale, Grenoble possède des industries d'ingénierie hydroélectriques et électriques sur lesquelles repose le développement d'un large socle d'industries de la filière. De l'ingénierie de biens d'équipements lourds (hydroélectriques et électriques), Grenoble se spécialise dans les activités à haute valeur ajoutée de la filière parmi lesquelles les circuits intégrés complexes, les mini et micro-ordinateurs[24], la robotique et la télématique. Et dans le début des années 80, 30% des circuits intégrés français sont fabriqués à Grenoble.

Ainsi de « petite bourgade » au sortir de la guerre, Grenoble passe à un statut de modèle de développement dans les années 80. En dépit de la crise des années 70, la région demeure sur une lancée de développement économique dans ce domaine, comme cet indicateur le prouve : de 1975 à 1983, le nombre d'entreprises de télécommunication ou d'électronique de 10 salariés ou plus s'accroît de près de 53%, alors que pour l'ensemble des entreprises de la région ce chiffre est de –15% (Dunford, 1988).

- Un développement endogène fondé sur les relations industrie/recherche et la promotion de l'esprit d'entreprendre.

La concentration de firmes dans des domaines connexes à la microélectronique repose sur un développement industriel endogène à la région. On trouve d'abord de grandes entreprises industrielles comme Merlin Gérin, Ugine, Kuhlmann, Pechiney, Rhône-Poulenc, entreprises locales des plus anciennes, ayant aujourd'hui acquis une stature internationale. Elles émergent dans la première partie du siècle et jouent un rôle important (mais aussi résultent) dans le développement de la région promouvant l'essor de fortes compétences en ingénierie, électronique, chimie et physique. Devenues entreprises de niveau international, elles consolident les forces de la région car, en y restant installées, elles y favorisent le développement de fournisseurs et sous-traitants.

Cette croissance endogène tient de façon importante à la proximité des mondes de l'université[25] et de l'industrie. Les nombreuses interactions entre ces deux mondes nourrissent le développement des industries existantes et facilitent celui de nouvelles pousses (start-up) ou entreprises essaimées (spin-off) sur base de contrats de recherche,

[24] La création de l'INRIA* en 1967, elle-même résultant de la prise de position des instances politiques sur « l'influence décisive qu'elle [l'informatique] allait jouer dans tous les domaines d'activités humaines. »**, et le Plan Calcul dont l'INRIA est un des organes d'exécution principaux, contribuèrent au choix de la trajectoire de la région grenobloise et apportèrent supports financiers, humains et matériels.
*L'Institut de recherche d'informatique et d'automatique, IRIA**,** est créé par le décret 67-722 du **25** août 1967. L'institut est l'ancêtre de l'INRIA
**Extrait du rapport Comité consultatif de la recherche scientifique et technique (CCRST) de 1966
[25] Définition au sens large – inclus INPG, l'Institut National Polytechnique de Grenoble, consortium de 9 écoles d'ingénieurs.

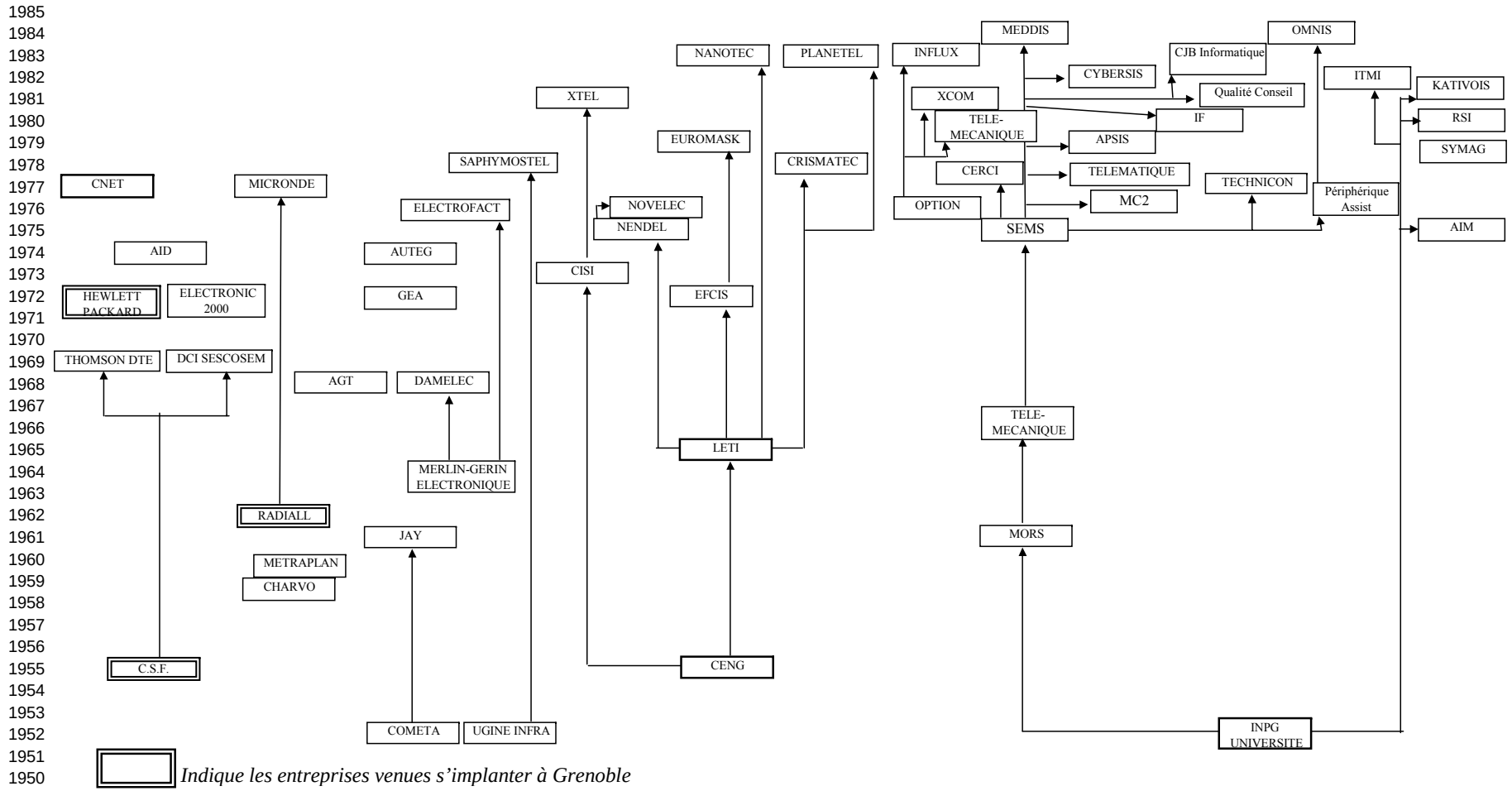
mais aussi en leur fournissant une main d'œuvre qualifiée. Les universités fournissent aux industriels locaux les compétences nécessaires à leur développement. Les écoles d'ingénieurs particulièrement servent un tissu industriel spécialisé ; plus, afin d'accompagner les entreprises dans leurs besoins, elles se transforment, s'adaptent et anticipent. Cet effort est ancien : dès le début du siècle, des cours de chimie ou de mécanique[26] sont introduits dans les programmes pour accompagner les développements des industriels. L'adoption du vocable « ingénieur physicien » à l'INPG est un autre exemple traduisant l'effort d'adaptation du monde universitaire aux besoins industriels locaux. Il est de plus courant pour les professeurs d'assurer les fonctions de conseillers dans les entreprises et pour les étudiants en doctorat de travailler sur des thèmes d'intérêt particulier pour les industriels ; ce qui permet aux étudiants de trouver un emploi ou même de créer leur propre emploi : l'INPG, comme l'illustre la Figure 1, est d'ailleurs une pépinière importante en terme de création d'entreprise.
Les deux univers sont donc largement imbriqués, réciproques et complémentaires.

L'essor de la région est également dû à l'esprit d'entrepreneur que les chercheurs sont encouragés à développer, dans le même esprit que ce que Saxenian (1994) relate à propos de la Silicon Valley. Louis Néel[27] déjà dans les années 60 encourageait les chercheurs dans les termes suivants : « oubliez votre travail routinier pour un plus innovatif […] et montrez que des recherches fondamentales effectuées dans un laboratoire universitaire n'ont pas pour but que de produire de la connaissance mais peuvent également avoir une utilité industrielle immédiate ». Montrant lui-même l'exemple, il crée sa start-up, même si cette terminologie n'existait pas à l'époque.

[26] Citons par exemple le cours de silicium purifié pour semi-conducteurs

[27] Louis Néel◊ est le premier directeur du CENG mais il a plus largement oeuvré au déploiement des sciences et technologies à Grenoble en y laissant son empreinte notamment sur les modes de collaborations entre acteurs de mondes différents : en rapprochant recherche et enseignement d'une part et chimistes et biologistes d'autre part.
Directeur de l'INPG, il ouvre en 1955 une section dédiée à la formation de techniciens pour le nucléaire afin de disposer de compétences au développement du CEA. Lorsque le centre s'installe à Grenoble, de nouveaux programmes d'enseignement sont créés. Néel est également un universitaire¤, directeur du Laboratoire d'Electrostatique et de Physique du Métal. Cette triple casquette le mène à instaurer une conduite originale de la recherche à Grenoble : une commission scientifique composée à part égale de scientifiques grenoblois du CNRS ou de l'Université est créée pour « assister le directeur pour la direction des recherches scientifiques et la formation professionnelle de chercheurs et de techniciens » (Ballu, 2006 : 30)

Figure 1 Le développement du secteur électronique à Grenoble



Source : Dunford, 1988

2.2 Un centre de recherche de haut niveau

Derrière la présence d'un acteur fort de la recherche se retrouve l'hypothèse d'Agrawal et Cockburn (2003), de la cheville d'ancrage (*anchor-tenant)*. Le postulat sous jacent est que "la présence d'une grande entreprise [ou plus généralement d'un acteur important] ayant une forte activité en recherche et développement améliore le système régional d'innovation à tel point que la recherche universitaire locale est plus facilement absorbée par l'industrie locale et stimule la R&D des acteurs locaux »[28]. Le CEA-Grenoble joue ce rôle dans le paysage grenoblois supporté par l'université de Grenoble et l'INPG.

- Le poids du CEA-Grenoble dans la recherche en micro-électronique et dans sa valorisation industrielle

Le CEA-Grenoble[29] occupe dans le paysage scientifique et technologique grenoblois une place importante de par :

- sa taille (de 13 agents à 2116 agents en 1990),
- sa localisation géographique (au cœur de la ville),
- ses installations (63 hectares, 6000 m² de salles blanches, 2 piles nucléaires)
- ses laboratoires (propres ou mixtes – 28% des équipes de la région grenobloise sont localisées dans l'enceinte du CEA-Grenoble[30]),
- le débouché qu'il représente pour les techniciens, ingénieurs et docteurs,
- l'essaimage d'entreprises (voir par exemple la Figure 2 pour les entreprises essaimées du Léti ou la Figure 1 pour une perspective historique)
- les contrats de recherche qui le lient à de nombreuses entreprises.

Depuis sa création en 1956, le CEA, installé à Grenoble a attiré de nombreux acteurs et organisations (laboratoires ou instituts de recherche internationaux par exemple) et transformé le territoire. Son installation provoque un accroissement des moyens (en ressources humaines et en financement) pour la communauté scientifique de Grenoble lui permettant d'ouvrir de nouvelles voies de recherche. Ainsi, le CEA est à la base de la capacité d'attraction de la région qui accumule des connaissances sur le monde de l'atome, car le CEA développe des programmes dans le domaine de l'énergie (nucléaire ou nouvelles énergies[31]) mais plus globalement dans les domaines de la chimie et de la physique de la matière (DRFMC[32]), de la biologie structurale (DRDC[33]) ou de

[28] Traduit par l'auteur de «the presence of a large, local, R&D-intensive firm—an anchor tenant— enhances the regional innovation system such that local university research is more likely to be absorbed by and to stimulate local industrial R&D." (Agrawal and Cockburn, 2003: 1227)
[29] Commissariat à l'Energie Atomique de Grenoble
[30] D'après le Guide des Laboratoires, 2002
[31] DTEN (Département des Technologies pour les Energies Nouvelles. Le DTEN est un département du CEA qui regroupe en 2002 plus de 220 permanents. Les objets de recherche concernent les cellules à hydrogène, les mini-sources d'énergie, le photovoltaïque, échangeurs de chaleur etc.
[32] DRFMC : Département de Recherche Fondamentale sur la Matière Condensée

l'électronique (Léti[34]). Grâce à cette diversité, de grands centres de recherche européens choisissent de s'y installer comme par exemple l'Institut Laue Langevin (en 1967 avec le réacteur à très haut flux), le laboratoire européen de biologie moléculaire (1977) ou l'Institut de Biologie Structurale (1992). Si le centre est utilisé par de nombreux scientifiques pour bénéficier de l'opportunité de mener de nouvelles expériences, la recherche n'y relève pas que du fondamental, comme les recherches plus appliquées développées au Léti[35] le montrent.

- Le rôle particulier du Léti dans le soutien à l'industrie, particulièrement locale

Dans le domaine de l'électronique, le Léti joue un rôle prépondérant dans le pôle grenoblois : d'une position d'unité de support du CEA en 1946, il devient le plus grand laboratoire du CEA à partir du début des années 1970.

Lorsque le Centre d'Energie Nucléaire de Grenoble est constitué, une unité de support en électronique, spécialisée dans le traitement du signal électrique, est créée, comme dans tous les centres du CEA. En effet, dans l'environnement hostile que forme un réacteur nucléaire, les instruments de contrôle de chaleur et d'autres paramètres sont mis à rude épreuve et doivent donc répondre à des critères, de résistance par exemple, très stricts. L'unité de Grenoble atteint néanmoins rapidement une taille bien supérieure à celle des centres de Saclay ou de Fontenay-aux-Roses, fournissant aux autres laboratoires du centre des services personnalisés. L'élément crucial qui accélère le passage de l'unité de support au statut de laboratoire (nommé Léti) est le fait que des organisations publiques et privées s'intéressent aux travaux menés dans le centre. Le directeur de l'unité d'électronique, Michel Cordelle, souhaite alors utiliser les compétences de son unité en complémentarité avec la physique fondamentale pour proposer des contrats aux industriels et participer au soutien à l'industrie électronique nationale[36]. Cependant, dans le milieu des années 60, les règles administratives du CEA n'autorisent pas de telles pratiques. De plus, les activités de l'unité de Cordelle ne sont pas considérées comme centrales au CEA. Néanmoins, grâce au soutien de Néel, l'unité devient laboratoire de recherche en 1967 et bénéficie même de conditions de fonctionnement assouplies qui permettront au Léti de très vite se développer: le laboratoire est autorisé à être financé partiellement par des ressources extérieures, à transférer le résultat de ses recherches aux industriels, à faciliter la mobilité des ingénieurs avec ces derniers dans ce but et à posséder un comité scientifique dirigé par un membre du monde industriel. Cette orientation initiale implique largement le Léti dans le développement industriel (Figure 2), particulièrement au niveau local.

---

[33] DRDC (Département Réponse Dynamique Cellulaires). Unité mixte de recherche (CEA/CNRS/INSERM/UJF) localisée au CEA. 247 personnes (2002) y travaillent de façon permanente dont 67 doctorants. Les mots clés du département sont biochimie, biotechnologies végétales, culture de cellules, immunologie et vaccins.

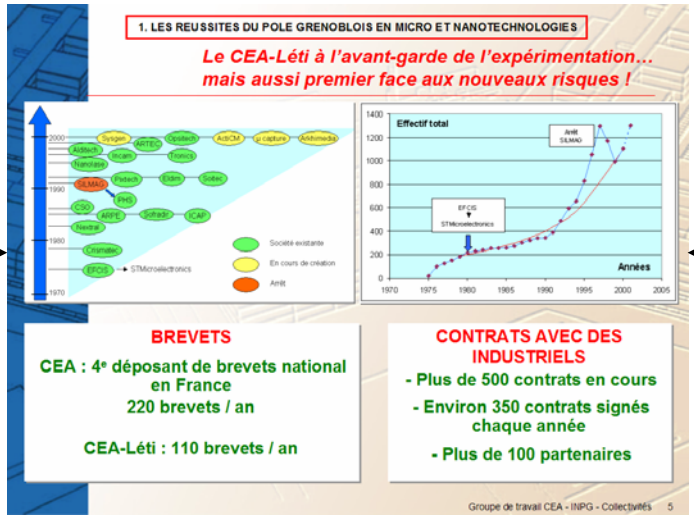
[34] Léti (Laboratoire d'électronique, de technologies et d'instrumentation). Les mots clés associés au laboratoire sont : microtechnologies, microsystèmes, télécom et santé (2002)

[35] En 1968, plus de la moitié du personnel du centre travaille sur des questions de recherche fondamentales (940 travaillent sur le site – le Léti compte alors 246 chercheurs et ingénieurs). Dans le milieu des années 90, le Léti compte 725 employés et le CEA-Grenoble 2000)

[36] Ce point est mentionné explicitement dans l'acte de naissance du Léti

Figure 2 Les fortes liaisons du Léti et du monde industriel.

Start-ups et spin-offs du Léti depuis les années 1970 (total=29 en 1998)



Effectifs des start-ups du Léti : plus de 1000 emplois directs dans la région

Source: extrait de présentation de J. Therme, 2001

- L'université dans la recherche

La recherche à Grenoble est étroitement liée avec l'université scientifique et technologique[37] de Grenoble, l'Université Joseph Fourier (UJF) qui compte plus de 17000 étudiants dont 28% sont en deuxième ou troisième cycle (2003). La part de la recherche y est non négligeable, l'université accueillant sur son campus de Saint Martin d'Hères 36 laboratoires (mixtes ou propres – hors SHS et SS). De plus, l'université se classe au 153-201 rang du classement des universités de Shanghai (6ème université française) : ce classement incorpore pour 40% des critères de recherche (nombres d'articles cités dans Nature et Science, et Citations dans le SCI) et pour 40% des critères de qualité des enseignants-chercheurs (nombres de prix Nobel et médaille Fields et nombre de chercheurs les plus cités dans 21 catégories)

L'INPG, consortium de neuf écoles d'ingénieurs[38], comptant 5200 étudiants[39], doit également être cité en tant qu'acteur important de la recherche. De part sa taille[40], l'INPG

[37] Les domaines de spécialisation sont biologie, chimie, informatique, mathématiques, mécanique, physique, sciences de la terre et de l'univers, médecine, pharmacie et sport.
[38] ENSIEG (Ecole Nationale Supérieure d'Ingénieurs Electroniciens de Grenoble)
ENSPG (Ecole Nationale Supérieure de Physique de Grenoble)
ENSHMG (Ecole Nationale Supérieure d'Hydraulique et de Mécanique de Grenoble)
ENSIMAG (Ecole Nationale Supérieure d'Informatique et de mathématiques Appliquées de Grenoble)
ENSERG (Ecole Nationale Supérieure d'Electronique et de radioélectricité de Grenoble)
EFPG (Ecole Française de Papeterie et des industries Graphiques)
ENSEEG (Ecole Nationale Supérieure d'Electrochimie et d'électrométallurgie de Grenoble)
ENSGI (Ecole Nationale Supérieure de Génie Industriel)
ENSISAR (Ecole Supérieure d'Ingénieurs en Systèmes Avancés Rhônes-Alpes)
[39] En comparaison, l'Ecole Polytechnique en compte 1600, L'Institut National Polytechnique de Lorraine 4000 et l'Ecole des Mines de Paris 800 (Données 2004)
[40] En France, hormis le CNAM, qui propose des formations à tous les niveaux, les écoles ou instituts sont de taille bien plus modeste

est atypique dans le paysage français. Contrairement à la tendance dans les grandes écoles d'ingénieurs françaises, il dévoue une part significative de ses activités à la recherche : l'INPG se classe 4ème en terme de nombres de contrats de recherche, 5ème en chiffre d'affaire total de la recherche (Classement le Point, 2004), compte 1200 enseignants et chercheurs[41] et délivre plus de 150 thèses par an[42].

2.3 Une région au capital social élevé

Déjà chez Marshall (1890), la « coopération des forces économiques et sociales » est citée comme un des facteurs importants dans la constitution d'un district industriel : les entrepreneurs se connaissent personnellement les uns les autres et se soutiennent mutuellement. Les travaux sur les districts italiens ont particulièrement mis en avant la place du capital social : liens familiaux et sociaux sont étroitement liés aux affaires. La proximité engendre de nombreuses opportunités de rencontres entre les acteurs facilitant les échanges d'informations (e.g. Marshall, 1890 ; Porter, 1990).

Le capital social joue en effet à Grenoble un grand rôle, à l'image de ce que les chercheurs travaillant sur les districts industriels (Beccatini, 1992 ; Belussi, 2001) décrivent. Les acteurs des sphères politiques, industrielles et universitaires non seulement se côtoient facilement dans leur monde respectif, mais également se mélangent et ce, à tous les échelons dans cette région « reculée » où même le marché dominical ou les sorties en montagne sont l'occasion de se rencontrer et d'échanger. Les ingénieurs du Léti (inclus les directeurs) sont souvent issus de l'INPG, des industriels participent au comité scientifique du Léti, les professeurs de l'INPG sont conseillers scientifiques dans les entreprises, les maires de Grenoble ou de villes environnantes sont d'anciens élèves de l'INPG ou ingénieur du CEA (comme par exemple H. Dudebout, J.F. Veyrat, M. Destot). Néel a su impliquer dès l'origine la région entière dans les sciences et technologies, ainsi que le grand public en instituant des visites du CEA ou en soutenant des partenariats scientifiques avec des collèges et lycées.

Cet élément se retrouve à Grenoble et prend même un relief particulier à cause du caractère géographiquement enclavé de la région. Si de prime abord, cette situation peut être considérée comme un désavantage, elle devient un atout notamment lorsque cela la préserve de la destruction lors des deux guerres mondiales. Allant plus loin même, elle favorise son développement endogène. La région étant d'un accès difficile[43], les acteurs locaux doivent compter sur eux-mêmes et développer sur place ce dont ils ont besoin. C'est ainsi que les industriels se rapprochent des universités pour résoudre leurs problèmes et qu'ensuite de nouvelles formations et pistes de recherches voient le jour,

[41] En comparaison, l'Ecole Polytechnique en compte 560, l'Institut National Polytechnique de Lorraine 560 et l'Ecole des Mines de Paris 260 (chiffres hors ITA, données 2004)
[42] En comparaison, l'Ecole Polytechnique en délivre 92 et l'Institut National Polytechnique de Lorraine 130 (Données 2004)
[43] Le train à grande vitesse ou les connections aéroportuaires n'étaient pas développées dans les années 60 à 80. Le TGV ne dessert Grenoble qu'en 1994.

rapprochant ainsi toujours plus les deux mondes. De plus, les courtes distances favorisent les synergies (e.g. Marshall, 1890 ; Carluer, 1999 ; voir Figure 3). Au-delà même des collaborations, les acteurs de différents milieux organisationnels et institutionnels développent une culture commune façonnée par l'enclavement et le milieu. Certains vont même jusqu'à déclarer que « l'esprit montagnard et le goût de l'innovation ont réussi à développer autour de Grenoble une véritable vallée du silicium française »[44] (Chicoineau, 2004).

Figure 3 Positionnement des activités de recherche dans la vallée grenobloise

Le paysage grenoblois se situe dans un sillon alpin dans lequel les acteurs se trouvent majoritairement à moins de 20 km les uns des autres par la route. Les sites les plus importants de R&D sont : Crolles où STMicroelectronics, Motorola, Philips sont par exemple installés ; Meylan, commune d'accueil de la ZIRST ; Saint Martin d'Hères où est situé le campus universitaire ; et Grenoble, plus particulièrement le Polygone scientifique où sont installés le CEA et le CNRS.

Echelle : Grenoble-Crolles : 15 km / Grenoble-Saint Martin d'Hères : 5 km

2.4 Un marché du travail ouvert

La présence d'une main d'œuvre qualifiée permettant de soutenir le développement du district ou du cluster est un autre élément mis en avant dans la littérature sur les clusters ou districts (*e.g.* Saxenian, 1994)

> "Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill they require" Marshall, 1890, book IV- Chapter X

Le dynamisme du marché du travail en lui-même c'est-à-dire, la mobilité entre les entreprises et la capacité du site à retenir la main d'œuvre formée sont également des éléments à prendre en compte dans l'évaluation du site (Maillat, 1995 ; Marshall, 1890) notamment car cela permet d'augmenter les transferts d'information[45] et les apprentissages entre acteurs (Porter, 1990)

L'université grenobloise (au sens large puisque nous y incluons également les écoles d'ingénieurs) assure aux industriels une main d'œuvre qualifiée et formée à leurs besoins. Elle joue un rôle important dans l'endogénéité de la croissance de la région par sa capacité à produire une main d'œuvre qualifiée nécessaire au développement des industries

[44] Centre de Culture Scientifique Technique et Industrielle ; http://interstices.info/display.jsp?id=c_5763
[45] Les « fameux » *spillovers*

locales[46] (mais également à la retenir sur place). La population grenobloise est dans sa globalité mieux formée que la population nationale[47]. Aussi limitées soient-elles, les statistiques présentées dans les Tableaux 1 a et b démontrent la capacité du tissu régional à absorber plus de la moitié de ses diplômés les plus qualifiés (bac+3 (techniciens) et au delà (ingénieurs et doctorants). Ces chiffres sont considérés par les spécialistes de l'OURIP[48] comme élevés et tendent à prouver le dynamisme de la région. Ceux-ci soulignent également l'adéquation entre offre de formation et demande de l'industrie locale et renforce l'argument signalé auparavant sur la proximité entre les deux mondes.

Tableau 1a Insertion géographique des diplômés de l'enseignement supérieur (UJF) deux ans après le diplôme (tous diplômes confondus)

UJF	Chimie (2001)	Physique (2001)	Biologie (1995)
Rhône-Alpes	**50%**	**59%**	**75%**
Isère	*25%*	*35%*	*33%*
Ile de France	**6%**	**16%**	**9%**
Autres Depts.	13%	16%	10%
Etranger	31%	9%	6%
TOTAL	**100%**	**100%**	**100%**

Source: OURIP, 1998 and 2004

Tableau 1b Insertion géographique des diplômés de l'enseignement supérieur (UJF) en biologie deux ans après le diplôme (par diplôme) (1995)

	Tous niveaux	bac + 3	bac +4	bac + 5/Ph.D
Rhône-Alpes	**75%**	**87%**	**82%**	**34%**
Isère	*33%*	*59%*	*22%*	*13%*
Ile de France	9%	0%	12%	21%
Autres Depts.	10%	13%	6%	21%
Etranger	6%	0%	0%	25%
TOTAL	**100%**	**100%**	**100%**	**100%**

Source: OURIP, 1998 and 2004

[46] Cette tendance n'est pas nouvelle et remonte au début du siècle.

[47] La population de l'Isère est globalement plus éduquée que la moyenne nationale pour toutes les classes d'âge. (Source : INSEE, 1999)

	âge en 6 tranches	diplômes								
		Etudes en cours	Aucun diplôme	CEP	BEPC	CAP BEP	Bac brevet profes	BAC+2	Diplômes supérieurs	TOTAL
ISERE	25 à 29 ans	7.3%	11.1%	1.0%	5.0%	22.9%	17.6%	17.4%	17.7%	100.0%
	30 à 39 ans	0.5%	14.7%	1.7%	6.9%	32.0%	14.8%	14.9%	14.3%	100.0%
	40 à 59 ans	0.0%	15.4%	15.0%	7.9%	27.8%	12.2%	10.1%	11.6%	100.0%
FRANCE	25 à 29 ans	5.9%	12.5%	1.3%	5.2%	25.1%	18.2%	16.0%	15.8%	100.0%
	30 à 39 ans	0.5%	15.7%	2.8%	7.6%	33.9%	14.3%	12.8%	12.4%	100.0%
	40 à 59 ans	0.0%	16.0%	16.4%	8.9%	28.4%	12.0%	8.5%	9.9%	100.0%

[48] L'OURIP est l'Observatoire Universitaire Régional de l'Insertion Professionnelle de l'Académie de Grenoble

La mobilité entre monde de la recherche et industrie est forte : l'existence de plusieurs zones scientifiques et technologiques dans la région facilite le développement de start-up et entreprises essaimées ainsi que la mobilité des scientifiques entre recherche et industrie (en effet, les entreprises essaimées le sont souvent avec plusieurs membres du personnel de l'entreprise d'origine)[49]. Citons en exemple, le cas d'EFCIS, aujourd'hui connu sous le nom de ST Microelectronics[50] après plusieurs rachats et fusions, résulte originellement d'un essaimage du CEA-Léti : plus de 100 employés du Léti (et son directeur de l'époque) quittent le laboratoire en 1972 pour fonder une entreprise autour de la technologie CMOS, à laquelle personne ne croyait à l'époque. En moyenne, sur la période 1968-1981, près de 50 ingénieurs ou chercheurs du Léti quittent le laboratoire chaque année pour aller travailler dans l'industrie. Plus récemment, SOITEC et OPSITECH sont deux start-up issues du Léti dans les années 90 qui se positionnent aujourd'hui au niveau mondial.
La mobilité peut être temporaire ou définitive et outre des mécanismes de détachement temporaires (par exemple pour créer une entreprise), il n'est pas rare de trouver au Léti des ingénieurs qui ont travaillé plusieurs années dans le monde industriel avant de venir (ou de revenir) au Léti. C'est d'ailleurs le cas de Jean Therme, directeur du CEA-Grenoble depuis 2002, ancien directeur du Léti et de l'actuel directeur du Léti, Laurent Malier.

2.5 Le support des autorités politiques

L'investissement des autorités publiques dans le soutien à l'innovation est davantage marqué dans la littérature liée aux technopoles (e.g. Gilly, 1987 ; Courlet et Pecqueur, 1992) que dans celles qui touchent aux districts, aux systèmes régionaux d'innovation (Cooke, 1992) ou aux clusters en général. Pourtant, l'impact des pouvoirs publics se ressent dans l'instauration de règles de concurrence ou de la propriété intellectuelle, c'est-à-dire au cœur même des relations entre entreprises (ces éléments relèvent des institutions).

Les autorités publiques peuvent également jouer un rôle plus pragmatique de soutien aux activités de recherche et d'innovation. Dans le cas de Grenoble, il est important de considérer aussi que l'industrie de la micro-électronique est au centre de stratégies locales[51] de développement comme l'illustre la création de zones d'activités (notamment la ZIRST en 1968 voir Encadré 1) ou le soutien aux industriels (notamment le financement de l'usine de ST Microelectronics, Crolles 1 en 1992).

[49] La Figure 1 appuie également ce fait.
[50] Aujourd'hui STMicroelectronics est un des plus grands fabricants mondiaux de semi-conducteurs
[51] On ne peut cependant pas négliger le rôle de l'échelon national qui a également participé à l'essor de l'électronique dans la région au travers de la politique des grands programmes dont le Plan Calcul est un exemple.

Encadré 1 La ZIRST : Zone pour l'Innovation et les Réalisations Scientifiques et Techniques

"C'est en 1968 que plusieurs personnalités du monde industriel et politique se prennent à rêver d'une Silicon Valley à la française. Premier parc à vocation de haute technologie en France avec Sophia Antipolis, la ZIRST, voit le jour en 1972 malgré les réticences des pessimistes qui ne voient là qu'une utopie de plus." (ZIRST.com)

Située sur 110 hectares à quelques kilomètres de Grenoble, la ZIRST est fondée sur cinq principes :
- faciliter l'implantation d'entreprises technologiques
- encourager les relations entre la Recherche, l'Université et l'Industrie
- permettre la création d'un bassin d'emplois d'avenir
- maintenir la qualité environnementale du site
- intégrer la vie de la zone aux communes alentours.

Elle offre la possibilité aux petites entreprises dont celles issues de l'INPG ou du CEA/Léti (EFCIS qui devint par le jeu de fusion et acquisitions ST Microelectronics) de s'implanter dans un environnement dynamique. Une structure telle que la ZIRST est un élément clé dans le succès de la région en électronique et informatique. Le site attire également de plus grandes entreprises et centres de recherches nationaux et internationaux tel que le CNET (France Telecom R&D), Schneider Electric, Sun Microsystems et HP ; ces implantations successives générant elles-mêmes de nouvelles activités. Le schéma 1 illustre la fertilité de l'environnement, la plupart des entreprises créées s'étant installée sur le site.

La région est de plus dotée de nombreuses structures de soutien à l'innovation. La littérature mentionne le capital risque que nous retrouvons présent à Grenoble sous la forme d'incubateurs ou de structures de valorisations industrielles dans les centres de recherche (Figure 4).

Figure 4 – les structures de soutien à l'innovation installées à Grenoble (soutenues par les autorités publiques – situation à la fin des années 1990)

Structures régionales	
ADEBAG	Association pour le DEveloppement des Biotechnologies dans l'Agglomération Grenobloise
ASTEC, ZIRST, Parc d'activités du Grésivaudan, de Montbonnot etc.	Zones d'activités et parcs technologiques dédiées aux hautes technologies
CEA Valorisation	Cellule de valorisation du CEA
CREALYS	Incubateur régional
GRAIN	Incubateur de Grenoble
BIOPOLIS	Incubateur régional de Grenoble spécialisé dans les domaines de la biologie (en liaison avec ADEBAG et BIOPOLIS)
ISERE SUD INITIATIVES	Structure supportant le développement d'entreprises à hauteur de 7700 euros
AMORCAGE RHONE-ALPES	Structure de support aux PME (en liaison avec l'ANVAR)
RHONE-ALPES CREATION	Entreprise de Capital Risque
AEPI	Agence d'Etude et de Promotion de l'Isère
Fondation Rhône-Alpes Futur	Fondation soutenant le développement régional
CCSTI	Centre de Culture Technique et Industrielle de Grenoble
Structures nationales ayant une antenne locale	
APCE	Agence Pour la Création d'Entreprise
ANVAR	Agence Nationale pour la Valorisation de la Recherche et de l'innovation
Structures nationales soutenant l'innovation	
CDC PME	Caisse des Dépôts et des Consignations
Réseau Entreprendre	Réseau soutenant la création d'entreprise et assurant du conseil
UNICER	Réseau National de Capitaux-Risqueurs

3 Grenoble à l'aube du deuxième millénaire

Le tableau qui vient d'être brossé évoque le dynamisme de la région dont les acteurs de divers mondes travaillent ensemble autour de la filière micro-électronique (intégrant physique, électronique et informatique) et constituent un cœur de compétences dans le domaine de l'électronique, de l'informatique et de la chimie.

Tableau 2 Grands chiffres des trois domaines de compétences de la région grenobloise[52].

	Electronique et micro/nanotechnologies	Informatique et industrie du logiciel	Chimie et bio-pharmacie
Emplois dans l'industrie	14500	11000	8300
Emplois dans la recherche publique	2100	1800	560
Diplômés du supérieur / an	1800	2550	1400

Source : d'après AEPI, Grenoble-Isère, 2002

Electronique et informatique/logiciels sont très complémentaires, notamment dans le passage micro/nano : l'architecture des circuits devient plus prégnante lorsque l'intégration (le nombre de composants) s'accroît. Le domaine de l'électronique et des microtechnologies offre l'opportunité à de nombreuses jeunes pousses de se développer tandis que de grandes entreprises comme Thalès, Radiall, Philips (1992), ST Microelectronics sont également localisés dans la région. En informatique et logiciel, de grands acteurs mondiaux sont présents sur le site et ont implanté des activités de recherche à l'image de Sun Microsystems ou de Hewlett Packard, de développement (et/ou d'intégration) comme Bull et HP/Compaq ou de service et d'ingénierie (SSII) tels que Schlumberger, Silicomp ou Teamlog. En 2000, le secteur du logiciel est le plus dynamique puisque 36% des start-up créées le sont dans ce domaine (AEPI, 2002).

La région de Grenoble est présentée comme pleine d'atouts, comme un terreau favorable aux innovations: une capacité à créer et à soutenir des entreprises, des domaines d'activités complémentaires, une main d'œuvre qualifiée et des interactions entre les mondes de la recherche, de l'industrie et de la formation fortes. Les pouvoirs publics sont également impliqués dans ces relations et les soutiennent. Néanmoins, dès le milieu des années 90, les acteurs grenoblois perdent du terrain face à la concurrence mondiale comme le Tableau 3a le montre. Des rumeurs circulent même sur le fait que le Léti, principal laboratoire de recherche appliquée en micro-électronique, doit fermer et que Jean Therme, réintégrant le CEA-Léti en 1998 et nommé directeur en 1999, doit en être le fossoyeur[53]. La qualité des recherches scientifiques n'est cependant pas remise en cause et le nombre de publications suit une tendance inverse à celle des brevets (Tableaux 3 a et b).

[52] Les chiffres datent de 2001, avant la signature de MiNaTec.
[53] Jean Therme a en effet mené plusieurs plans de restructuration lorsqu'il travaillait dans l'industrie, ce qui a pu renforcer les rumeurs.

Tableaux 3 a et b Part de Grenoble dans la compétition technologique et scientifique mondiale

3a – brevets

	1999		1995	
	part/UE (‰)	Rang	part/UE (‰)	Rang
Petite couronne parisienne	19.6	3	21.1	1
Paris intra-muros	15.6	6	17.9	4
Yvelines	10.3	14	10.9	12
Grenoble	**8.7**	**20**	**9.5**	**17**
Lyon	8.3	27	8.5	21

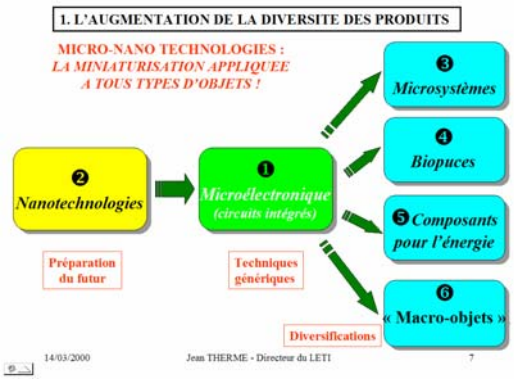
3b – publications scientifiques

	1999		1995	
	part/UE (‰)	Rang	part/UE (‰)	Rang
Paris intra-muros	29.9	2	32.8	2
Petite couronne parisienne	12.8	14	15.3	9
Essone	12.1	15	13.1	14
Lyon	9.3	22	9.3	25
Toulouse	7.6	29	7.1	35
Grenoble	**7.5**	**30**	**7.2**	**33**

Source: OST, 2004

A l'aube de l'an 2000, face aux évolutions des sciences et des technologies, les acteurs de la micro-électronique avouent devoir renouveler leurs briques de base c'est à dire disposer de brevets génériques qui pourront ensuite être rendus spécifiques pour des applications industrielles (Figure 5). Si des relations entre recherche appliquée (comme au Léti) et recherche fondamentale (à l'université, au CNRS, au CEA) existent comme nous l'avons montré, elles ne permettent pas d'intégrer suffisamment rapidement les avancées scientifiques aux problématiques industrielles (Figure 6).

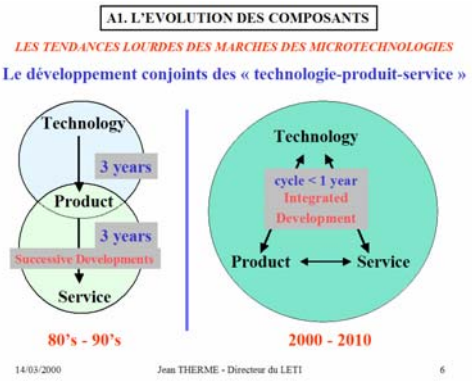
Figure 5 Renouveler les technologies génériques



Cette diapositive montre la nécessité de développer une technologie générique pour plusieurs applications : les développements de la micro-électronique peuvent nourrir des applications en microsystemes, biopuces, composants pour l'énergie ou « macro-objets ».

Source : Jean Therme, directeur du Léti, 2000

Figure 6 Impact de l'évolution des S&T : la réduction des cycles d'innovation



Ce transparent illustre les transformations de la production de technologies et de produits. Les temps cycles sont raccourcis, ce qui implique des transformations dans l'organisation des acteurs de la filière

Source : Jean Therme, directeur du Léti, 2000

4 2005 : sous les feux de la rampe

La fin des années 90 se caractérise donc, à Grenoble, par une appréhension face à l'avenir. De l'extérieur, le visiteur non averti peut considérer les transformations qui ont eu lieu comme une continuation du succès grenoblois : le pôle Minatec, qui se veut « premier pôle européen d'innovation en micro et nanotechnologies » y a vu le jour, regroupant sur un même site 3500 personnes ; des activités dans le domaine des matériaux, de la biologie et de la santé, du logiciel et des matériaux se sont greffées au nouveau modèle ; des leaders mondiaux des semi-conducteurs se sont associés sur le site, investissant sur 5 ans, près de 3 milliards d'euros.

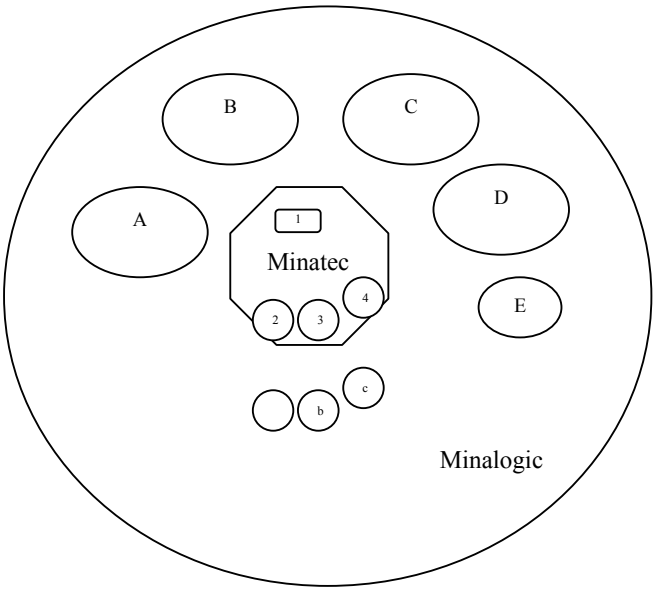
Il s'agit bien là bien d'un succès, mais d'un renouveau plus que d'une continuation, puisque de profondes transformations dans l'agencement des acteurs, dans leurs relations et dans leurs façons de travailler ont eu lieu.

Cette section illustre le contraste avec la situation précédemment exposée et vise à mettre en avant quelques-uns des traits les plus caractéristiques des changements en cours[54]. La différence principale tient aux nouvelles liaisons des acteurs qui, jusqu'aux années 2000 constituent une masse d'acteurs encore localisés les uns à côté des autres tandis qu'en 2005, c'est un sentiment de cohérence sur l'ensemble du territoire qui domine.

Le nouveau modèle (2005) est présenté ici au travers du discours développé par les acteurs du site. Cette approche est privilégiée parce que le discours sera au centre de nos préoccupations dans les chapitres suivants. La Figure 7 décrit schématiquement le nouveau modèle.

[54] Ce sont ici les grandes lignes de la situation de 2005 qui sont brossées tandis que des détails trouvent leur place dans les chapitres suivants.

Figure 7 – le nouveau modèle grenoblois



<u>Légende</u> :

Ces éléments représentent de nouvelles façons de travailler plutôt que les acteurs eux-mêmes.

Minatec : pôle d'innovation en micro et nanotechnologies de Grenoble

1. *RTB (Recherche Technologique de Base) : cœur de Minatec*
2. *OMNT (Observatoire des Micro et Nanotechnologies) : groupe de veille scientifique*
3. *Services à la valorisation : gestion des contrats et de la propriété intellectuelle*
4. *IDEAs'Lab (Laboratoire des usages)*

Plateformes scientifiques et technologiques :

- *A. Objets communicants*
- *B. NanoBio*
- *C. Nouvelles Sources d'Energies*
- *D. Technologies Silicium (Nanotec 300 et Alliance)*
- *E. METIS*

Autres :

- *a. Incubateur*
- *b. Zones d'activités*
- *c. capital risque*

Minalogic : pôle de compétitivité Isère/Rhône

4.1 De multiples transformations qui changent le visage du site

La mise en place de nouvelles collaborations, la restructuration d'acteurs centraux et l'établissement de nouveaux acteurs sur le site sont les signes du dynamisme retrouvé de la région grenobloise. De nouvelles formes de collaborations se sont mises en place liant de façon plus forte les acteurs entre eux. Celles ci sont institutionnalisées au travers de nouvelles pratiques et de nouvelles façons de collaborer. Ces nouvelles coopérations sont instaurées sur base d'investissements importants.

4.1.1 Minatec, au cœur du nouveau modèle

Tout d'abord, Minatec, socle des nouvelles collaborations est fondé en 2002 pour 150 millions d'euros, financé aux deux tiers par les collectivités territoriales. Minatec est le pôle d'innovation grenoblois en Micro et Nano Technologies. Il se compose d'un bâtiment à trois ailes (une pour la recherche[55], une pour la valorisation industrielle[56] et une

[55] Plus de 40 laboratoires y trouvent place

pour la formation[57] reliées par une structure d'animation[58]), pouvant accueillir 3500 personnes sur un total de 44000 m². Le bâtiment, de par son architecture (de nombreux espaces de rencontres ont été aménagés) et sa localisation (situé à la bordure du terrain du CEA et du Polygone Scientifique), est conçu pour promouvoir les synergies entre les participants.

La rationalité de Minatec est de constituer un cœur de technologies génériques, briques de base nourrissant les innovations dans un certain nombre de domaines d'applications. Ce point est celui qui fut soulevé au travers de la Figure 5. Promouvoir ces technologies requiert :

- d'une part le rapprochement des acteurs en amont et en aval de la filière physiquement parlant mais également par le biais de moyens de collaborations innovants (*i.e.* la Recherche Technologique de Base ou RTB) et,
- d'autre part, l'investissement dans des outils technologiques lourds (les plateformes et outils de caractérisation).

Ces principes constituent la base de Minatec qui s'articule autour :

1) du triptyque recherche / formation / industrie dans une mesure tout à fait inédite en France,
2) de moyens d'incitations à la recherche de rupture par des financements de la Recherche Technologique de Base) et de moyens lourds de recherche.

4.1.2 Les outils et services communs de Minatec

L'essence de Minatec est de « faire travailler les acteurs ensemble ». Pour ce faire, un ensemble d'outils et de services sont installés dans l'enceinte même de Minatec.

- La Recherche Technologique de Base

Le mécanisme privilégié pour arriver à ces fins est la RTB. Il s'agit d'un outil incitatif à la recherche collaborative risquée. Programme national instauré en 2003, il est utilisé[59] par les acteurs du CEA-Grenoble comme moyen de financement de projets visant à la rupture technologique. Chaque projet est construit autour d'un démonstrateur, objet physique intégrant un certain nombre de fonctionnalités qui seront valorisées dans des innovations en fonction des grands domaines d'applications comme la médecine ou l'électronique grand public. Le but du projet est de résoudre les nœuds technologiques (et donc de

[56] 10000 m² de locaux et salles blanches sont alloués à des start-ups en phase de croissance, à des laboratoires communs (recherche/industrie) ou à des industriels.
[57] Deux écoles d'ingénieurs de l'INPG (en électronique et en physique), soit 1000 élèves et 120 enseignants chercheurs
[58] la Maison des Micro et Nano Technologies (MMNT)
[59] Programme national construit autour de cinq centrales technologiques par le CNRS et le CEA, la RTB permet de financer soit des investissements soit des projets au libre choix des partenaires.

prendre des brevets) pour ensuite développer de nouvelles innovations sur ces bases. Dans ce cadre, les relations entre recherche fondamentale et recherche appliquée sont essentielles puisque la résolution des nœuds requiert le développement de recherches bien en amont de ce que les ingénieurs de la recherche appliquée pratiquent habituellement. Ces derniers doivent être en mesure de visualiser un objet et de « le vendre » pour enrôler les chercheurs de domaines plus fondamentaux dans l'exploration de solutions originales. Résultant de ces collaborations (qui entraînent de nouvelles façons de travailler pour les ingénieurs et les scientifiques de la recherche la plus amont) les brevets génériques permettent le transfert d'innovation vers les industriels via les plateformes (cf paragraphe 4.1. 3).

- Les services généraux au sein de la Maison des Micro et NanoTechnologies

Ceux-ci relèvent d'aspects techniques ou pratiques et sont organisées au sein de la Maison des Micro et des NanoTechnologies, structure d'animation de Minatec

L'Observatoire des Micro et NanoTechnologies (OMNT) est institué dans le cadre du programme de la RTB comme outil de veille scientifique. Il regroupe 175 chercheurs du CEA et du CNRS sur l'ensemble du territoire français qui, périodiquement, font le point sur l'état de l'art dans sept[60] domaines liés aux micro et nanotechnologies, évaluent la pertinence des informations et les diffusent dans l'ensemble du réseau. Au travers de cet effort, l'objectif de l'OMNT est d'identifier les signaux faibles pour permettre aux acteurs d'investir dans des lignes de recherches que les experts qualifient de « porteuse d'avenir » et de repérer les concurrents au niveau international et se positionner face à eux.

L'objectif ici est bien d'accroître les liens entre recherche fondamentale et recherche appliquée[61] en fournissant aux deux parties des éléments pour approcher l'autre.

Afin de favoriser la valorisation des recherches, des services de soutien au dépôt de la propriété intellectuelle, à la valorisation de celle-ci (recherche de clients et recherche de capitaux pour essaimage), ou à sa défense (veille juridique) sont mis à disposition des chercheurs du site. Des liens privilégiés sont entretenus avec des zones d'activités locales ou d'incubateurs, tout particulièrement GRAIN, l'incubateur de la région Rhône-Alpes.

[60] En 2005, on compte : (1) les matériaux et composants pour l'optique, (2) les nano-composants, (3) les microsources d'énergie, (4) l'instrumentation pour la biologie, (5) l'électronique moléculaire, (6) la nano-construction, et (7) l'électronique organique.

[61] A noter cependant que les relations entre recherche appliquée et recherche fondamentale s'organisent également en dehors du cadre strict de Minatec comme au travers de fédérations. Les liaisons entre recherche appliquée et recherche fondamentale s'organisent également dans le cadre de fédérations, de réseaux ou d'instituts localisés à Grenoble. Deux organisations sont ici particulièrement importantes : la Fédération Micro et Nano Technologies Rhône-Alpes (FMNT-RA), créée en 2002, regroupe six laboratoires de la région Rhône-Alpes du domaine. L'Institut des Nanosciences (IdNano) de Grenoble est une fédération de recherche du CNRS financée par le ministère de la recherche. Sa mission est de "Coordonner et développer l'activité de laboratoires et de chercheurs de plusieurs disciplines, en nanosciences, sur le site de Grenoble". http://www-idnano.ujf-grenoble.fr/idnanopresentation.htm

4.1.3 Les centres d'intégration

Les acteurs se retrouvent autour de plateformes qui regroupent un ensemble de compétences et de moyens technologiques dans d'un domaine donné. Chacune vise à produire des brevets spécifiques à partir des brevets génériques développés grâce à la RTB à laquelle nous faisions référence précédemment. Les recherches pour parvenir à ces fins nécessitent des investissements lourds et la concentration d'équipements et de matériels de caractérisation. Ceux-ci sont organisés en plateformes, qui permettent d'intégrer recherche fondamentale (résultant en la publication d'articles scientifiques), recherche appliquée (résultant dans la prise de brevets génériques) et valorisation industrielle (résultant dans la prise de brevets spécifiques), d'où le choix du vocable « centres d'intégration » choisi par les microélectroniciens eux-mêmes pour qualifier l'espace.

L'espace se sous-divise en quatre grandes plateformes[62] auxquelles nous pouvons ajouter de plus petites plateformes spécifiques.

- Plateforme en nano-biotechnologies

La plateforme NanoBio réuni environ 300 chercheurs du CEA-Grenoble, de l'UJF, du CNRS et de l'INSERM[63] autour d'applications pour la santé et la biologie qui pourraient être développées sur base des micro et nanotechnologies. NanoBio a reçu un support de 45.2 millions d'euros de la part des collectivités locales en 2006[64].

> « Les applications concernées par NanoBio sont nombreuses: mise au point de nouveaux médicaments et de nouveaux modes thérapeutiques, développement d'outils miniaturisés (biopuces, laboratoires sur puces, biocapteurs...) pour le diagnostic médical, les contrôles alimentaires, l'analyses bactérienne de l'eau, etc »[65].

La plateforme a pris une envergure internationale s'alliant à des partenaires de la plateforme MinaLogic et du Lyon Biopole pour constituer le pôle NanoBio qui coordonne le réseau d'excellence européen Nano2Life[66]. Soutenu par la Commission européenne, le pôle NanoBio prépare les fondements du futur Institut Européen des Nanobiotechnologies.

- Plateforme en nouvelles sources d'énergies

La plateforme dédiée aux nouvelles sources d'énergies est appelée INERA (Initiatives Nouvelles Energies Rhône-Alpes). Fondée en 2003, l'INERA résulte d'une initiative

[62] Ces différentes plates-formes constituent, ensemble, la plus grande et plus complète des plates-formes de nanocaractérisation en Europe.
[63] INSERM : Institut National pour la Santé et la Recherche Médicale.
[64] Les mêmes qui ont financé Minatec
[65] http://www.techno-science.net/?onglet=news&news=1839
[66] Nano2life est créé en 2004 et rassemble une vingtaine de pays et 200 chercheurs.

nationale regroupant des laboratoires de recherche (CEA-Grenoble, INPG, Université de Savoie) et des industriels (Schneider, Air Liquide, EDF). «Initiatives Nouvelles Energies Rhône-Alpes» ou «inventer la distribution électrique de l'avenir», l'INERA a « pour but de favoriser la diversification des nouvelles sources d'énergie renouvelables (photovoltaïque, piles à combustibles, éolienne etc.)» [67]

- Plateforme technologies du silicum : Nanotec 300[68]

Nanotec 300 est la plateforme recherche dédiée au 300 mm, le nouveau standard mondial de production de semi-conducteurs (standard défini par la roadmap ITRS au niveau international). La plateforme se construit en 2003 sur base d'un partenariat, appelé « Alliance » entre Freescale[69], ST Microelectronics et Philips, trois géants mondiaux des semi-conducteurs.

> « Nanotec 300 vise à franchir les prochaines étapes de la course à la miniaturisation : les 45, 32 et 22 nanomètres et au-delà. La plateforme fonctionne 24 heures sur 24 et sept jours sur sept. Elle utilise le principe des "boucles courtes", développé par le CEA-Léti et STMicroelectronics durant les années 80, qui consiste à faire circuler des plaques de silicium entre les chercheurs du site Minatec – pour les procédés innovants – et ceux de Crolles – pour les opérations technologiques stabilisées. Cette organisation optimise l'utilisation des ressources et réduit les temps de développement. » (CEA Grenoble, 2002: 14)

Son fonctionnement mobilise 150 chercheurs pour un investissement de plusieurs centaines de millions d'euros, dont 60 millions sont apportés par le CEA. Seuls quelques centres au niveau mondial sont capables de s'offrir de tels équipements et programmes de recherche de par l'investissement que cela représente : la région grenobloise se positionne ainsi dans les premiers rangs mondiaux.

Encadré 2 – L' Alliance au cœur de Nanotec 300

'L'Alliance', partenariat pré-compétitif entre ST Microelectronics, Philips et Freescale, localisé à Crolles 2 est l'un des signes des plus visibles au niveau international, des transformations de l'espace grenoblois. D'une part, ce nouveau consortium de recherche et développement devient numéro 2 au monde derrière Intel. D'autre part, Motorola a fermé une partie de ses activités de recherche aux Etats-Unis pour permettre à sa filiale, Freescale, de s'installer à Grenoble. Ce choix, au détriment des Etats de New York ou du Texas et de Taiwan, est la reconnaissance des industriels dans la nouvelle organisation du pôle grenoblois. Enfin, cet accord inclut un investissement des trois acteurs de plus de 3 milliards d'euros sur cinq ans.

'L'Alliance', fondée en 2002, offre une nouvelle image à la région et traduit des nouvelles pratiques entre les partenaires: recherche fondamentale, recherche appliquée et valorisation industrielle, étroitement liées par des plates-formes et des processus telle que la RTB, se complètent les uns les autres dans la perspective de développement les bases de nouvelles innovations.

[67] Guide des ressources technologiques du Sillon alpin – l'offre des laboratoires publics en direction des entreprises, Novembre 2004

[68] Lorsque les microélectroniciens évoquent le 300 mm, cela correspond au diamètre des plaques de silicium sur lesquels sont gravées les puces. Le standard a d'abord été 150 mm puis 200 mm. La taille s'accroît pour permettre de produire en une seule fois davantage de puces. En plus de l'augmentation de la taille du disque de silicium, la taille des puces diminue. De la combinaison de ces deux éléments proviennent de nombreux problèmes technologiques et scientifiques (interactions entre matières à très petite échelle, taille de la gravure etc.)

[69] Entreprise résultant de la scission des activités de Motorola. Freescale ayant repris les activités « semi-conducteur »de Motorola ;

victimes d'avalanche, les billets électroniques ou le suivi médical à distance des personnes âgées dépendantes »[70]

Cette plateforme est étroitement liée à Ideas'lab, laboratoire d'un type particulier qui est moins orienté vers les aspects technologiques que vers les usages. Fondé en 2003, le laboratoire est commun au CEA-Léti, à ST Microelectronics et France Télécom R&D. Il est dédié à la création[71] d'objets et services incorporant des micro et nanotechnologies. L'originalité est d'y incorporer à côté des chercheurs et ingénieurs en microélectroniques, des scientifiques de sciences sociales (*e.g.* ergonomie, sociologie, anthropologie) ainsi que des consommateurs finaux qui valident les concepts.

- Plateforme METIS

Les nouvelles dynamiques incluent également des acteurs plus traditionnels ou établis de longue date dans la région. La plateforme expérimentale METIS en est un exemple. Il est ici repris pour illustrer ce point.

METIS est en 2006 encore dans une phase expérimentale (d'une durée 3 ans) qui vise à évaluer l'apport de micro et nanotechnologies aux problématiques des industriels du textile et du papier.

> « Les Micro et Nano Technologies, grâce à une miniaturisation extrême et aux propriétés des nanomatériaux, peuvent être source d'innovation dans des secteurs traditionnels comme le textile ou le papier, notamment en matière d'identification et de traçabilité ou encore de nouveaux procédés de traitements de surfaces plus écologiques et plus durables, mais aussi de vêtements ou documents intelligents. » (AEPI, 2006[72])

L'objectif est d'identifier des technologies émergentes, d'analyser les marchés et de permettre le transfert de technologie. Néanmoins, les partenariats se nouent dans les deux sens, les techniques des industries traditionnelles pouvant bénéficier aux processus de la microélectronique. Citons, en exemple, les compétences des industriels du textile dans l'impression sur substrats souples qui pourraient faire évoluer les techniques dans la micro-électronique.

4.1.4 La réorganisation du Léti et du CEA-Grenoble

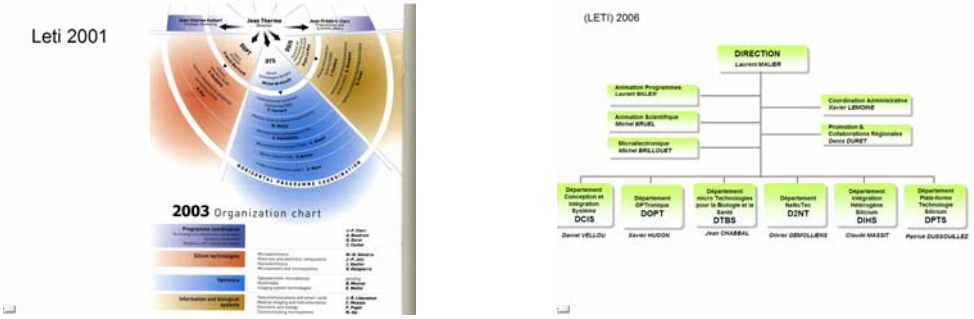
Considéré comme le cœur technologique de Minatec, le Léti s'est réorganisé pour intégrer l'espace Minatec. D'un point de vue des ressources humaines, le Léti passe de 600 personnes en 2000, à 1200 personnes en 2006. L'organigramme du laboratoire a donc

[70] Document inaugural de Minatec, 2005 :18
[71] Création dans le sens « design »
[72] http://www.grenoble-isere.com/101-metis.htm

évolué plusieurs fois pour incorporer cette nouvelle masse de chercheurs et techniciens Figure 8a).

D'un point de vue technique, les laboratoires du Léti anticipent les changements d'organisation et voient leurs activités recentrées pour s'imbriquer autour des plateformes. De plus, pour faire face au surcroît d'activité généré par l'augmentation des collaborations, l'approche autour des salles blanches est totalement revue pour éviter le phénomène de goulot d'étranglement qu'elles représentent jusqu'à présent : la plus grande salle blanche du Léti tourne depuis juillet 2004 en 3x8h et 7j/7 et est organisée de façon autonome aux laboratoires[73]. Cet effort de rationalisation est indispensable pour la performance du site puisque la salle blanche est le nœud central de la recherche au Léti[74].

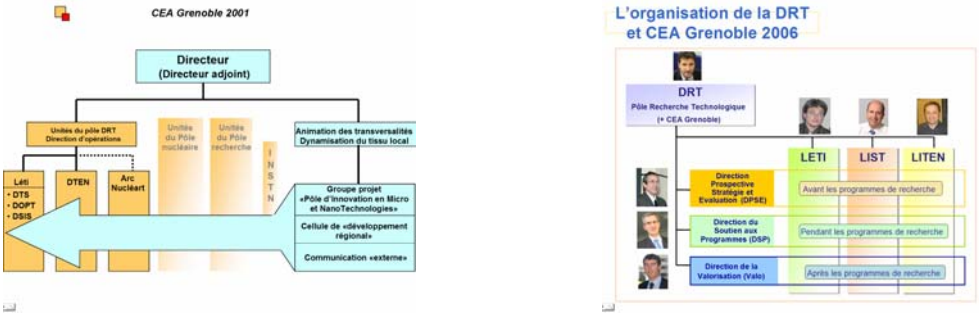
Figure 8a – Organigrammes du Léti: contraste des situations 2001 et 2006



Investissant dans les micro et nanotechnologies au travers de Minatec de façon forte, le CEA-Grenoble (Figure 8b), et plus largement le CEA[75], ont également fait l'objet d'importantes transformations : en 2005, les activités nucléaires de Grenoble sont par exemple stoppées. Le CEA ré-organise ses trois centres en quatre pôles (énergie nucléaire, défense, recherche technologique[76] et recherche) pour regrouper les thématiques communes, ce qui a pour conséquence le déplacement de certaines activités. A Grenoble, les efforts se concentrent sur les aspects de recherche technologique et de recherche (en physique et en biologie notamment). La philosophie de telles transformations est que les centres n'hébergent plus seulement un ensemble d'activités mais en assurent la cohérence et l'ancrage territorial.

[73] Ce qui peut avoir des avantages en terme d'efficacité générale de l'organisation mais génère également des désavantages puisque les chercheurs n'y ont plus accès directement.
[74] La réalisation des circuits sur lesquels travaillent les chercheurs est faite en salle blanche. La fabrication d'un circuit requiert plusieurs dizaines d'étapes différentes. Les chercheurs travaillent par lots, qu'ils soumettent aux techniciens de la salle blanche qui réalisent la commande. Les lots sont composés d'échantillons de circuits qui sont soumis à une série de tests ou d'expériences en relation avec les méthodes utilisées, les matériaux, les étapes etc. La salle blanche est ainsi en charge de plusieurs centaines de lots devant être traités de façon indépendante.
[75] Le CEA a pourvu MiNaTec d'un terrain, participé à hauteur de 25% au financement du bâtiment et investi 60 millions d'euros dans la plateforme Nanotec 300
[76] Recherche technologique doit être comprise comme recherche dont le but est de générer du transfert de technologies.

Figure 8b – Organigrammes du CEA-Grenoble : contraste des situations 2001 et 2006



4.1.5 La mise en cohérence d'ensemble : Minalogic

La mise en cohérence de l'ensemble des activités touchant à Minatec se réalise au travers de la labellisation de Minalogic (Micro Nanotechnologies et Logiciel Grenoble-Isère compétitivité - Les solutions miniaturisées intelligentes) comme pôle de compétitivité[77] en juillet 2005. Minalogic est l'un des six projets de dimension internationale valorisé de la sorte. Ces pôles se partagent 1000 millions d'euros[78] sur 3 ans au travers du financement de projets labellisés dans chacun d'eux. Les industriels, tels Thalès, ST Microelectronics, Philips, Motorola, Bull, Radiall, prennent une part importante à la gouvernance du pôle (dont le but est avant tout la compétitivité des territoires et des entreprises). L'objectif de Minalogic est « de créer un avantage compétitif durable dans le domaine de l'électronique et du logiciel embarqué sur puce en s'appuyant sur les valeurs d'usage de la miniaturisation, de l'intelligence et de la connectivité » (Dossier de candidature de Minalogic, 2005: 11). Les projets proposés dans le dossier de candidature témoignent du degré d'intégration des partenaires (Encadré 3)

Minalogic permet globalement d'intégrer les technologies développées dans Minatec dans des systèmes complexes grâce au développement de logiciels qui gèrent la complexité et la personnalisation des tâches à effectuer. Cette étape est cruciale pour le développement des systèmes sur puces qui intègreront les innovations issues des recherches de Minatec.

[77] « Un pôle de compétitivité se définit comme la combinaison, sur un espace géographique donné, d'entreprises, de centres de formation et d'unités de recherche publiques ou privées, engagés dans une démarche partenariale destinée à dégager des synergies autour de projets innovants. » CIADT, 2005: 4

[78] Le budget total de l'appel est de 1500 millions d'euros mais les plus grands pôles se partageront la plus grande part, estimée à 1000 euros.

Encadré 3 Extrait du dossier de candidature de Minalogic : les projets du pôle

« Les projets de Minalogic visent d'abord à maîtriser la complexité qui se cache derrière la simplicité d'usage apportée par les solutions miniaturisées intelligentes. Ils répondent à quatre enjeux particuliers :

- anticiper les ruptures technologiques de la nanoélectronique. Le projet GIN (Growth Initiative for Nanoelectronics) Centre de Matériaux porté par SOITEC répond à cet enjeu.
- maîtriser la conception des circuits complexes. Le projet GIN Conception Assistée par Ordinateur, porté par STMicroelectronics, permet de concilier rendement de fabrication élevé, time to market et complexité croissante des circuits
- interfacer les puces avec leur environnement. Le projet MEMS to Market, porté par une jeune pousse TRONICS, répond à l'appel des consommateurs de nouvelles fonctions basées sur les microsystèmes.
- maîtriser les outils de développement des solutions miniaturisées intelligentes : Le projet EmSoC (Embedded Systems on Chip) Centre d'Intégration répond à cet enjeu est porté par plusieurs partenaires dont Polyspace, Silicomp, Capgemini, Schneider Electric, STMicroelectronics,...

Les projets industrie-recherche de Minalogic visent ensuite la conquête de nouveaux marchés :

- marché de l'efficacité énergétique, avec le projet EmSoC Gestion Intelligente de l'Energie porté par Schneider Electric
- marché de la connectivité et de la mobilité, avec le projet EmSoC MOTIVITE porté par STMicroelectronics
- marché de la chaîne de l'image, avec le projet Imageurs, porté par un quatuor de sociétés, leaders dans des segments de marché complémentaires (sécurité, grand public, médical), ATMEL, Sofradir, Trixell et ULIS,
- marché de l'industrie traditionnelle avec un premier projet pilote « électronique grande surface » porté par le consortium METIS/Sofileta/Piolat/Ciba"

Source : Dossier de candidature de Minalogic, 2005: 12

4.2 Une visibilité internationale renforcée

Ces nouvelles dynamiques engendrent un accroissement de la visibilité de la région. Celle-ci se situe désormais au cœur de cercles concentriques qui ne sont pas purement géographiques puisque Grenoble a tissé des liens très forts avec des partenaires étrangers.

- L'ensemble des acteurs grenoblois se mobilise

Les acteurs de toutes les sphères concourent au rayonnement international de la ville.

Nous avons déjà évoqué l'implication des entreprises, dont les plus grands investissements se situent dans l'Alliance et dans Minalogic. Le monde de la recherche, avec ses fédérations, ses instituts et grands équipements, n'est pas en reste.

Mais citons également les collectivités locales qui investissent dans la promotion de la région. L'AEPI[79] soutient l'organisation de séminaires de promotion de Minatec à l'étranger (comme au Japon en 2002), produit des rapports d'activité sur la région

[79] Agence d'Etudes et de Promotion de l'Isère

largement diffusés, et assure un soutien à l'installation de partenaires. Grenoble a également développé ses infrastructures d'accueil que ce soit par la construction d'une cité internationale, l'agrandissement de l'aéroport de Grenoble, la construction de salles de Congrès ou l'augmentation d'offre de logements temporaires.

Un élément clé reste la visibilité de l'université de Grenoble. Placée au 153-201ème rang des universités au niveau mondial dans le classement de Shanghai. La fragmentation des universités n'est pas un problème spécifique au cas grenoblois. Les quatre universités grenobloises ont en 2005 conclu un accord de coopération qui étend leur précédente notion de « pôle européen » à un niveau stratégique en créant « Grenoble Université ». L'objectif est au niveau local de mutualiser les actions, renforcer les partenariats entre formations mais aussi d'accroître le rôle de l'université dans le développement territorial. Au niveau international, Grenoble Université vise l'excellence et une meilleure lisibilité[80]. Grenoble Ecole de Management choisit également de promouvoir la région en se spécialisant dans le management de la technologie ; cette stratégie inclut un volet international fort qui se traduit par exemple par l'obtention en 2004 de l'accréditation de l'AACSB[81] que seules quelques écoles de commerce possèdent en France (Essec, HEC ou l'ESC Paris).

- Des partenaires privilégiés dans quelques régions en France et en Europe

Le partenaire le plus proche de Minatec "hors sol" est le Centre Suisse d'Electronique et de Microtechnique (CSEM). Il entretient des relations privilégiées avec le Léti depuis 2002 à tel point qu'il est le sujet d'une section entière, au même titre que Minatec, sur son site internet. L'apport du CSEM à Minatec est double. D'une part, du point de vue technologique, les activités des deux centres sont complémentaires, le CSEM ayant une position forte dans les micro systèmes. Des échanges de briques technologiques ont également lieu, ce qui rend place le partenariat à un niveau stratégique élevé. D'autre part, d'un point de vue organisationnel, l'expérience du CSEM est importante même si son modèle de développement est différent[82] de celui du Léti. Le CSEM a une longue expérience de l'international et une réputation de bonnes pratiques dont le Léti bénéficie par extension[83].

Minatec mène également une action menant à coordonner les efforts de recherche entre les trois plus puissantes régions européennes en microélectronique autour de l'IMEC (Belgique) et de l'institut Fraunhofer de Dresde (Allemagne). Cette entreprise a pour but

[80] Grenoble Université se positionne en tant que PRES (Pôle de Recherche et d'Enseignement Supérieur), labellisation en cours de réalisation dans le ministère de la recherche et de l'Education Nationale.
[81] Association to Advance Collegiate Schools of Business : label international de qualité des écoles de commerce.
[82] Le modèle de développement est différent de celui du Léti car il est capable de perdre près de la moitié de ses effectifs lors d'un essaimage ; d'où les relations très étroites du CSEM avec son environnement.
[83] Selon D. Grand, responsable du développement territorial au CEA-Grenoble, ce partenariat aurait permis au Léti de recevoir une offre importante de la part de plusieurs leaders des semi-conducteurs.

de profiter des infrastructures réciproques, se chiffrant en centaines de millions d'euros pour les instruments, pour développer des projets de recherches ambitieux.

- Des échanges avec des partenaires français, européens, américains et asiatiques

Au niveau national, les acteurs grenoblois sont intégrés dans de nombreux réseaux dont le plus important est le Réseau des Micro et Nano Technologies, précédemment cité.

Au niveau européen, Grenoble se situe au cœur de plusieurs réseaux spécialisés tel que Nexus[84] et Eurimus ou de réseaux d'excellence à l'image de Nano2Life dont la coordination est assurée depuis Minatec. La région développe également des partenariats en matière de formation : en collaboration avec l'Ecole Polytechnique Fédérale de Lausanne et l'Institut Polytechnique de Turin, le premier master international d'ingénierie -spécialité nanotechnologies - a vu le jour en 2004. De nombreuses écoles d'été sont organisées également sur le site (la première école européenne d'été en nanosciences et nanotechnlogies ESONN[85] date de 2004 en partenariat entre le CEA, le CNRS, l'INPG et l'UJF).

Enfin, à l'échelle mondiale, Grenoble entretient des relations ciblées avec les plus grands centres aux Etats-Unis (AlbanyTech dans l'Etat de New-York, le consortium SEMATECH), au Japon à Tsukuba (consortium SELETE) ou à Taiwan (ITRI). Les accords incluent le plus souvent une partie recherche forte pour mutualiser les infrastructures et une partie formation. Notons par exemple, l'accord signé entre le Léti, le centre NanoQuébec et AlbanyTech.

> "Un accord tripartite a été signé fin mai entre le CEA LETI, NanoQuébec et le College of Nanoscale Science and Engineering (CNSE) de l'Université d'Albany, constituant ainsi la plus importante plateforme de recherche mondiale sur les nanotechnologies. Les trois organismes disposent chacun d'un vaste réseau qui englobe à la fois chercheurs, industriels et collectivités publiques ; en particulier, le CNSE de l'Université d'Albany conduit des partenariats recherche/industrie avec des géants tels que IBM, General Electric et AMD. A travers cette entente, les trois partenaires souhaitent mettre en commun leurs réseaux respectifs et lancer des programmes conjoints." Source: CEA Technologies n°77 octobre 2005

[84] Nexus s'est d'ailleurs installé sur le site de MiNaTec en 2002 alors que son siège était basé à Berlin
[85] European School of Nanoscience and Nanotechnology

5 Conclusion

Ce chapitre a pour la fonction d'exposer l'objet général de la thèse : le cluster grenoblois en micro et nanotechnologies. Il présente l'évolution de la région grenobloise dont le processus linéaire est remis en question par la mise en avant de l'épuisement du modèle datant des années 70.

La première partie montre une région qui s'est construite sur une longue période et dont la réussite se trouve dans le développement d'un cœur de compétences et d'acteurs en électronique et informatique. Grenoble dispose de tous les éléments cités dans la littérature pour être qualifié de « succès » : une concentration de firmes spécialisées autour de la filière ; des acteurs de la recherche forts et une cheville d'ancrage, le CEA-Grenoble ; un certain liant participant aux transferts de connaissances ; un marché du travail ouvert ; le soutien des pouvoirs publics et la présence de structures de soutien à l'innovation. Néanmoins, cette partie s'achève dans une perspective peu favorable. Les acteurs se trouvent « embourbés » sur la voie qui les avait amenés au succès mais qui, à l'aube des années 2000 pourrait ne plus leur permettre de faire face aux évolutions de l'industrie microélectronique et à la compétition qui se joue désormais à un niveau mondial. La force scientifique de la région n'est pas remise en cause, mais les relations entre les différents univers de la recherche et de l'industrie, telles qu'elles sont construites, ne suffisent plus à assurer la pérennité du modèle grenoblois.

La dernière partie de ce chapitre dépeint une situation tout à fait différente. En 2005, le cluster grenoblois achève sa transformation par la labellisation de Minalogic dans le cadre de la politique des pôles de compétitivité. La région se repositionne ainsi sur l'échiquier international et se trouve lancée sur une nouvelle trajectoire grâce à la mise en place de relations reconstruites entre les acteurs, de nouvelles pratiques et façons de travailler et de modes de collaborations originaux ayant été instaurés entre les partenaires scientifiques, universitaires et industriels. Minalogic achève la mise en cohérence de l'ensemble des composantes du système. Il s'agit en fait de l'étape finale de la création d'une nouvelle institution, qui trouve son origine dans la construction de Minatec en 2002.

Minatec[86] est en effet le socle de la nouvelle institution. Sa création marque le début de l'emboîtement des différentes pièces que nous avons évoquées dans la dernière partie de ce chapitre. Il concentre l'essence de la nouvelle institution car il encapsule une certaine vision des mondes futurs et en particulier de l'organisation de l'industrie de la micro-électronique dans la région grenobloise pour les 15 années à venir. La prise de risque quant au succès de la transformation de l'espace est donc la plus grande lors de la construction de Minatec. C'est pourquoi nous choisissons de concentrer le travail de recherche sur cette période.

[86] Nous faisons ici référence au bâtiment. En effet, Minatec est en 2002 un pôle d'innovation centré autour de ce bâtiment. Minatec en 2005 comprend un concept beaucoup plus large que le bâtiment seul et reprend la RTB, les plateformes, l'OMNT, Ideas Lab, la MMNT etc.

Chapter 2 - Literature Overview of the "Institutional Entrepreneur"

1 Introduction

This chapter is designed as an introduction to the theoretical concepts that follow in Chapter 5, 6 and 7.

After the demonstration of the contrast between Grenoble region' two faces, Chapter 1 ends with the statement that Grenoble went through important transformations that affected its actors' internal arrangement including their collaboration schemes and ways to consider the microelectronics industry as science and technologies dynamics put pressure on the industry members. Institutional theories offer a perspective to understand the change that occurred between the two periods: we consider that this deep change is linked to the creation of a new institution.

We first define what institutions are which shall explain our positioning and our focus on the institutional entrepreneur. Second, we describe what the broad categories of actions of the institutional entrepreneur are. Third, we detail the means by which the institutional entrepreneur manage to create or transform an institution. This review of literature leads to a series of question about the work of the institutional entrepreneur that are asked in a concluding section.

1.1 Defining Institutions

Definitions of institutions are multiple and vary based on the emphasis of scholars on factors such as symbols, power, interests and rationality. Rather than adopting a single definition, wechoose to use here Scott's pillars framework (1995) and to accept that institutions are variously comprised of "cultural-cognitive, normative and regulative elements. That together with associated activities and resources provides stability and meaning to social life" (Scott 2001:48). Institutional scholars put more or less emphasis on each of these elements, which as a consequence, produce different institutional research streams; but all acknowledge the fact that social order is governed by rule systems and cultural schemes that constitute social structures that empower and constrain actors (Giddens, 1979). Economists and rational economy scholars stress the role of regulation; sociologists, in the early time of institutional theories, emphasised normative aspects, while, since the eighties, cultural and cognitive elements received more attention (Scott, 1995). Following Hargrave and Van de Ven (2006), institutions are here understood as institutional arrangements and not as institutional actors. The reason behind this distinction is that the concept of institutional arrangement may apply thus as well to individuals or groups of organisations, which is the case here[87].

[87]we shall in the following chapter speak of new institutional arrangement of actors.

Institutional theory scholars have been struggling with the broad issue of why institutions do emerge. This question is dual: it encompasses both the conditions of their emergence and the reasons of their being, the latter receiving the most attention. Initially, rational theorists considered that for efficiency reasons, notably transaction costs ones, actors organise themselves i.e. define rules such as intellectual property rights or organisational forms and that institutions' reasons for being were to increase the performance of the system. Rationales are to decrease the uncertainty of the transaction between actors entering in an exchange. Sociologists go beyond this and add that:

> "effectiveness, efficiency and other types of performance measures do not exist in a vacuum but require the creation of distinctions, criteria, common definitions and understandings—all institutional constructions. The broader cultural-cognitive, normative and regulatory aspects of institutions shape the nature of competition and of markets, as well as the meanings of effective performance and efficient operation" (Scott, 2004:18).

Institutions are characterised by their persistence and their stability; they require little action and are not reproduced by collective actions but by routines (Jepperson, 1991): they are taken-for-granted. In that sense, they constraint and control behaviours because they impose the ways social coordination is organised. A more positive way to consider them is that they reduce uncertainty – human beings are risk adverse (DiMaggio, 1988) - as they offer frameworks, "programmed actions" (Berger and Luckmann, 1967: 75) or "common responses to situations" (Mead cited by Parboteeah et al., 2003). For example, scientific regimes are institutions[88] and Kuhn (1972) clearly illustrates how regimes support researchers in defining problems and ways to solve them.

1.2 Shift in Interest in Institutional Theories towards the Institutionalisation Process

This (initial) top-down approach to institutions, i.e. their impact on social behaviour, highly formatted scholarly works. The focus was essentially to explain similarity between models (Scott, 2004), which led to a large amount of works on isomorphic diffusion processes (Tolbert and Zucker, 1996; DiMaggio and Powell, 1983). However, this emphasis kept away scholars from studying the conditions under which institutions emerge, as well as the situations of institutions' disappearance (DiMaggio, 1988). Oliver (1992) initiated work on the disinstitutionalisation process of institutions, but what happens to disinstitutionalised institutions is still understudied (see however Giddens, 1984; Ogata, 2006). When institutional scholars got interested in institutions as a process including a beginning, a middle and an end (Tolbert and Zucker, 1996), institutional change came in the forefront of the agenda.

The shift from institutional effects to institutional processes in scholarly work opens the door to consider bottom-up strategies to influence or replace existing models. Institutional change often results from an external shock: understanding reactions to it induced scholars

[88] Jepperson (1991) proposes three forms of institution: formal organisations, regimes and cultures.

to address the question of agency in institutional change because of the diversity of the response actors can develop (Oliver, 1991). From this moment on, lines of research concentrated on the ways actors can promote and support the transformation or the creation of institutions. Such agents are called institutional entrepreneurs: "new institutions arise when organized actors with sufficient resources (institutional entrepreneurs) see in them an opportunity to realize interests that they highly value"(DiMaggio, 1988).

1.3 Focusing on the Institutional Entrepreneur

However, considering agency in an institutional context is paradoxical: how can actors, embedded in structures, break away from them? First, studies focusing on cognition and psychology opened the way studies on entrepreneurs which characterise moral, social, psychological aspects of these heroes. But another way to look at this issue is by simply acknowledging that these actors have specific interests that they pursue and that they work at achieving the realisation of their interests: from this starting point, we can focus on what they do and how they work. This is this line of reasoning that many scholars used, which eventually led them to reconsider the paradox (ex: Boxenbaum and Battilana, 2004; Beckert, 1999; Dorado, 2005).

We take the same perspective and focus on the action of the institutional entrepreneur. In this chapter, our first intention is not to solve the paradox above cited or to characterise the institutional entrepreneur, despite the fact that the label 'institutional entrepreneur' is in itself highly ambiguous. This review of literature seeks to clarify the action of the institutional entrepreneur with the goal to better understand the concept, but above all, to identify areas to which the thesis could contribute. This work that brings together contributions in relation to institutional entrepreneurship is very useful at the moment because it has not yet been theoretically defined; it essentially relies on an accumulation of empirical studies. Almost twenty years after its first introduction by DiMaggio in 1988, the concept of institutional entrepreneurship diffused largely, from institutional theories to organization theories, sociology (Fligstein, 1997), social movements, strategic management, innovation studies and many other streams of research. The flexibility of the concept, broadly defined as an actor who mobilises resources and support with the aim to transform existing institutions or to create new ones (Maguire et al., 2004), allows it to cross disciplinary boundaries. Numerous case studies, mostly monographic ones, used it, enriched it incrementally, and opened up many areas of research. The variety of uses of the concept of "institutional entrepreneur" is such that the number of articles in journals (Leca et al., 2005), of special issues (*Organization Studies* call on the subject received more than 70 manuscripts), of conference sessions (EGOS 2006, for example) or of workshops increases year after year. However, this diversity eventually leads to a blurring of the actual concept, and there have been only a few theoretical efforts undertaken to clarify the term and the action of the institutional entrepreneur (Dorado, 2005; Fligstein, 2001, Beckert, 1999).

The methodological section that follows details how the literature review is approached. Then, we shall focus on the two main actions that the institutional entrepreneur is carrying out before presenting the ways that are used to achieve them. The last section shall present the points that may require further investigation; points that are then detailed in the following chapters.

2 Methodology

The literature overview encompasses 43 papers and articles in which the concept of an entrepreneur acting to transform/create institutions mostly under the labels of "institutional entrepreneur" or "institutional entrepreneurship" has been used. proceeded as follows: first, we gathered a few references that were recurrently cited in our readings on the subject, among which DiMaggio, 1988; Powell and DiMaggio, 1991; Oliver, 1992; Rao, 1994 and 1998; as well as from authors known for their work on the subject, such as Lawrence/Lawrence et al. (1999, 2002, 2004, 2005), Fligstein (1997, 2002) and Phillips/Phillips et al. (1999, 2002, 2004, 2005). Based on these readings, we determined another set of readings with the criteria that the core concept of institutional entrepreneur should be included in the text as more than just one sentence. We then cross-checked our own references with Leca et al.'s review of literature (2005) to be sure that we were not missing any important piece of work.

Facing the literature, the first question dealt with the identification of the institutional entrepreneur. Some case studies identified a single individual (Hargadon and Douglas, 2001; DiMaggio, 1988; Hardy and Phillips, 1999; Fligstein and Mara Drita, 1996), others, a couple of individuals (Maguire et al., 2004), a collective of human beings (Lawrence et al., 2002; Rao, 1998; Haveman and Rao, 1997; Anand and Watson, 2004; Suddaby and Greenwood, 2005; Wade Benzoni et al., 2002), professionals (Greenwood et al., 2002; Zilber, 2002; Holm, 1995; Hwang and Powell, 2005; Rao et al., 2003), an organisation (Garud et al., 2002; Déjean et al., 2004; Zimmerman and Zeitz, 2002; Munir and Phillips, 2005; Demil and Bensédrine, 2005; Durand and McGuire, 2005) or an industry (Rao, 1994; Leblebici et al., 1991; Aldrich and Fiol, 1994). Some authors, mostly those proposing theoretical conceptualisations, stayed vague on the issue (Suchman, 1995; Clemens and Cook, 1999; Lawrence, 1999; Creed et al., 2002; Seo and Creed, 2002; Fligstein, 1997; Dorado, 2005; Lawrence and Suddaby, 2006), or proposed that it involves several levels of identity (Lawrence et al., 2005; Hardy and Phillips, 1999). When it was possible to identify an agent, the literature overview did not highlight such striking differences between the cases as one might suppose. Instead, we found similar situations of fight for legitimacy, actions and tactics (Fligstein, 1997) to mobilize resources and support, use of power etc. across the different cases. If individual characteristics such as the possession of social skills (Fligstein, 1997), the ability to link the project to one's own characteristics (Wade-Benzoni et al., 2002), or the temporal orientation towards the future

(Dorado, 2005; Seo and Creed, 2002) are cited and seem to be applicable to individuals, they are also more or less implicitly found in case studies on collectives or organizations. Answering to Maguire et al.'s call (2002: 675) for the differentiation between the individual and an organisation as an institutional entrepreneur, we tend to think that this question is not the most essential one (see also Lawrence and Suddaby, 2006); but that more emphasis should be placed on the process of institutional entrepreneurship. In general, one observes in the literature that the notion of institutional entrepreneur is interchangeable with that of the process of institutional entrepreneurship. This is confusing, and may need enlightening in the future.

Instead of focusing directly on who the institutional entrepreneur is, we would rather focus on the saying "Tell me what you do, I will tell you who you are" to eventually gain more insight into the question. This reinforces the initial interest in the action of the institutional entrepreneur that what earlier stated. We therefore went through the literature with the objective to determine what the work of the institutional entrepreneur is. We shall review first the broad tasks that the institutional entrepreneur is entailed to realise: not only does he promote institutional change, but he has an interest in effectively institutionalising it.

3 Actions of the Institutional Entrepreneur

The action of the institutional entrepreneur is centred on two aspects: (1) to promote institutional change. This ability is linked to personal attributes that ought to be mentioned because, even if they are not the principal object under investigation in our discussion, they impinge on the strategies the institutional entrepreneur can set up. (2) To institutionalise change. Institutionalising change means making it last: communities, borders and governance structures root change in the present and the future.

3.1 Promotion of Institutional Change

The promotion of institutional change or the work required to change institutions entails from the institutional entrepreneur a willingness to achieve change. Moreover, his[89] position in the institutional field impacts on the opportunity to promote change and the ease with which he could achieve it.

- Willingness and Strategic Action for Institutional Change

One could describe the institutional entrepreneur as motivated (Anand and Watson, 2004) or, following DiMaggio's terminology that he is interested.

[89]we shall use the masculine form to refer to the institutional entrepreneur although a female, an organisation or a group of organisations may also play this role

Motivation/interest, however, is different from intentionality. Indeed, in most case studies, the action leading to change is a deliberate one from the institutional entrepreneur, despite the fact that he may not be aware of the breadth of the changes that he is starting with his actions (Lawrence, 1999).

Institutional change is often described as being induced by a misalignment between actors' needs, interests, and the current social arrangement. As Seo and Creed state: "Although actors can become reflective at any time, the likelihood of a shift in collective consciousness that can transform actors from passive participants in the reproduction of existing social patterns into mobilized change agents increases when actors continually and collectively experience tensions arising from contradictions in a given sociohistorical context" (2002: 230). In situations of uncertainty, actors tend to act more strategically by modifying the rules of the game in an effort to reduce risk (DiMaggio, 1988; Fligstein, 1997). Uncertainty is greater in fields featuring low degrees of institutionalisation (Fligstein, 1997), or in unstructured or under-structured fields (Phillips et al., 2004), among them, emerging fields. Although these situations offer more possibilities for action, Beckert (1999) defends the opposite point, stating that situations of certainty offer more opportunity for actors to look for change. This distinction may be however too simple and there are more than one aspect to consider: Dorado (2005) argues that the opportunity of change varies from opaque to transparent and hazy depending on the context, and that it is only one aspect to be considered in evaluating when an institutional entrepreneur is most likely to intervene.

We classify types of actions accomplished by institutional entrepreneurs in two broad categories. In both categories, case studies account for the emergence of new industries or business lines, which therefore involve radical change. The first type of action is the one that dominates (it accounts for more than 70% of the case studies), and we classify them as:

- 'The creation of a space in which opportunities are expected to grow and from which the institutional entrepreneur or others could benefit' (Beckert, 1999; Suchman, 1995). Situations are numerous, and include: the creation of the so-called 'Kodak moment' by Kodak which, for example, changes aspects of family life (Munir and Phillips, 2005); the creation of a new business line supported by the 'Big Five' firms in Canada in the accounting industry which induced a change of identity of accountants (Greenwood et al., 2002); the elevation of HIV associations to major players in the pharma-business (Maguire et al., 2004); the proposition of the Single-Market Project in Europe by Delors as a collective frame that allowed the European Community to break through its internal crisis (Fligstein and Mara Drita, 1996); the creation of watchdog associations to protect consumers which led to quality redefinition from businesses (Rao, 1998); the development of contests to show the reliability of automobiles and encourage the development of the mass consumer market (Rao, 1994); Edison's support of an electricity system in order to create a system in which his innovation could be promoted (Hargadon and Douglas, 2001); the creation of a new measurement tool to measure social

corporate performance by ARESE which led to the creation of a new industry (Déjean et al., 2004). In each case, institutional entrepreneurs acted intentionally to change existing rules; what characterises all of them is 'vision'. Even though this terminology is rarely cited in these studies, it can be used, since, according to Beckert (1999), the institutional entrepreneur is an "analytically distinguished social type who has the capability to take reflective position towards institutionalized practices and can envision alternative modes of getting things done." Often, it is recognized that institutional entrepreneurs develop new scripts, schemas (Clemens and Cook, 1999), or frames of reference (Fligstein and Mara Drita, 1996); 'vision' is kept for studies analysing discourse. The term "vision" is often associated to greatness of action: this is what one could infer from the term "moral entrepreneur" (Suchman, 1995), "ideological activist" (Rao, 1998), or "political entrepreneur" (Fligstein and Mara Drita, 1996; Clemens and Cook, 1999; Levy and Egan, 2003), but it is not reserved for institutional entrepreneurs developing new businesses (ex: Edison and the various companies cited above). The latter come closer to Schumpeter's definition of the entrepreneur (1934).

- The second kind of actions that led to institutional change is characterised by actors who take advantage of a situation for their own profit, or as a reaction to a situation, tensions (Rao, 1998), an exogenous event, crisis or other[90]. They did not promote new visions, but by the newness (and effectiveness) of their action, they did attract the attention of followers. Lawrence and Phillips describe "the classical institutional entrepreneur as an innovator whose ideas and actions set the tone for the whole industry" (2004: 707). Rapid innovation flow that followed is a vector for institutional change (Lawrence and Phillips, 2004). Zimmerman and Zeitz label them "fashion setters" (2002). Those cases are characterised by specific goals/interests of the actors, but also by the non-intentionality of their action in modifying institutions. Let us cite the case of the entrepreneur who developed whale-watching in British Columbia, benefiting from the wide positive macro discourse towards these animals; or, the development of thrift associations as a reaction to macro factors such as immigration, population movements, new work conditions etc. (add sources) ;.

- Position of the Institutional Entrepreneur

Institutional entrepreneurs can be central actors (Lawrence, 1999; Garud et al., 2002; Munir and Phillips, 2005) in the field, new comers (Déjean et al., 2004), small players (Maguire et al., 2004; Lawrence and Phillips, 2004; Holm, 1995), or players on the fringe (Leblebici et al., 1994; Anand and Watson, 2004). The position of the institutional entrepreneur in his field is an important element to consider when evaluating the degree of legitimacy from which he benefits: actors central to the field (incumbents) are more likely to benefit more from legitimacy than new entrants (Garud et al., 2002; Hwang and Powell, 2005).

[90] The differences between emerging field and destabilized field have not yet been explored in the literature (see also Maguire et al., 2002)

Issues of power are also at work here. Powerful actors have easier access to political and bureaucratic mechanisms (Lawrence, 1999). The institutional entrepreneur can base some strategies on power; in such cases, they are then often explicitly referred to as political strategies. Demil and Bensédrine (2005), for example, illustrate how corporations succeeded in influencing a regulatory process on industrial wastes in France during the 1990s through the use of a combination of pressure and legitimisation tactics, in order to gain legitimacy and influence regulatory debate. It is suggested that stakeholders are more likely to listen to powerful actors (Phillips et al., 2004). Powerful actors also have more control over professional discourse (Lawrence, 1999). Moreover, powerful actors are more likely to secure access to scarce resources (Dorado, 2005). If actors aiming at institutional change are not powerful enough to impose their views, it is important that they are supported by powerful actors such as professionals or state authorities (Rao, 1998; Fligstein, 2001), or to reach positions in which they can be considered as the spokespersons leading the coalition (Maguire et al., 2004).

Centrality (Zilber, 2002) - and power - in a field are closely linked to the network of the institutional entrepreneur. Social and cultural capitals are crucial elements in emerging fields when positions and roles are not yet secured. When studying the emergence of HIV/AIDS treatment advocacy, Maguire et al. (2002) pointed to the position of Roberts and Turner. They succeeded in their action of structuring the field as they were able to bridge together diverse stakeholders, and had access to dispersed sets of resources due to the richness of their social and cultural capital (such as being openly gay, HIV positive individuals in a volunteer position located in a urban centre). Powerful actors, however, cannot rest solely on their authority to convince others to follow them. It is only one aspect that can help them in the establishment of an institution. Innovation studies abound with cases showing how a small newcomer to a field, introducing radical ideas and change, has turned down the help of a powerful actor (see also Leblebici et al., 1991).

3.2 Institutionalisation of Change

The aim of the institutional entrepreneur is to institutionalise the change he promotes, to make it lasting. The institutionalisation process aims at imposing on the long run new frames (Snow et al., 1986), new rules, norms and culture to set up a more efficient institutional arrangement (Meyer and Rowan, 1991). With this aim, he carries out three main tasks: building communities, creating borders and enacting governance structures. These three categories initially emerged based on Powell and DiMaggio's work and were then adapted based on case studies found in the literature:

> "The process of institutional definition, or "structuration", consists of four parts: an increase in the extent of interaction among organisations in the field; the emergence of sharply defined interorganisational structures of domination and patterns of coalition; an increase in the information load with which organisations in a field must contend; and the development of mutual awareness among participants in a set of organizations that they involved in a common enterprise" (1991:65)

- Building Communities

Building an institution is first about building communities that share the same interests and/or have common point of views. All cases focusing on the mobilisation process or collective actions illustrate particularly well this point, even though it is present, even if it is implicit, in all studies. Communities result of and are built to support the mobilisation process. Maguire et al. (2002) show how two institutional entrepreneurs create an awareness in different circles, manage to bring together people with different backgrounds and interests and to create a community. Garud, Jain and Kumaraswamy's study of the way Sun Microsystems tries to impose Java as technological standard (2002) is another evocative example: by offering free access to its technology, Sun created a community by promoting collaboration between partners. Holm who worked on the transformation processes in Norwegian fisheries (1995) clearly showed how institutional entrepreneurs need to mobilise different communities: the internal one constituted of fishermen and merchants and the external one that is composed for example of the State government.

- Creating Borders

Community building is closely related to border definition i.e. the establishment of who is part of the institution from who is not part of the institution. Haveman and Rao (1997) provide a representative example of community building and border creation as they study the development of the early thrift industry: the constitution of funding loans for construction presents the case of community building as, for example, they share common values and goals; it also illustrates border definition as individual of the community are its members (not everyone is indeed accepted in the community and can benefit from loans).

Studies focusing on identity building are generally well-suited to demonstrate this point because an identity is defined in opposition to another one. Creed et al. (2002:481) even use Hunt's terminology: "protagonists, antagonists and audience of uncommitted but potentially mobilised supporters". Anand and Watson (2004), working on the case of the Grammy awards highlight the work required for new categories of music to be included in the tournament. The acceptance of rap music redefined what is recognized as legitimate by professionals in the field. The following quote illustrate this point : "We can infer that what is at stake in such conflicts is the very definition of what constitutes a field, since inclusion into tournament rituals requires actors to use the available symbolic, political, and economic resources as material in constructing self-serving accounts of their own legitimacy (Friedland & Alford, 1991 cited in Anand and Watson, 2004: 76). we could last cite Durand and McGuire's work on accreditation associations (2005) whose members rely on the competitive advantage of being recognized members of the association.

- Enacting Governance Structures

The last element to take into consideration to achieve an institutionalisation process is the set up of governance mechanisms. These governance mechanisms are basic rules of the

game, which can include notions of property rights, rules of exchange and/or coordination principles. One of the most striking examples from the literature set is found in Fligstein and Mara Drita's study (1996) on the emergence of the Single Market project. They show that only by implementing the principle of mutual recognition to adopt the new Single Market directives was Delors, the institutional entrepreneur, successful in establishing a basic common framework. Setting up a standard is considered as an element of the institutionalisation process because it constitutes a coordination mechanism between actors: Déjean et al. (2004) and Garud et al. (2002) both illustrate the work that it entails. The former focuses on the development of corporate social performance measurements by a company named ARESE. The newly created indicator comes as a standard in the industry to evaluate firm'social performance: it links ARESE to financial and corporate market actors, to institutional owners. Garud et al.'s example (2002) points to the need to establish clear and transparent rules of the game: as Java is an open source software, licence fee payment are not necessary to use it. However, the strategy that Sun, Java's initial promoter, implemented was more a proprietary one, which induced doubts from the community. In our discussion, the fact that no clear governance mechanisms are established may lead to failure of institutionalisation.

3.3 Ways to Achieve Institutional Change

How does the institutional entrepreneur proceed to promote a new institution and create communities, borders and governance systems? The literature review points to three essential means that constitute actions strings for the institutional entrepreneur. Globally, we shall refer to these as tools for the mobilisation process (with the objective of creating a new institution).Therefore, this section is divided in three subsections: first, strategies to gain resources and supports are detailed. Then a second section points to the discursive aspects of the institutional entrepreneur's work and what it entails, while the last section focuses on lock in creation as a way to engage actors in the process.

3.3.1 Strategies to Acquire Legitimacy and Other Resources and Supports

While the institutional entrepreneur must be concerned with the position he occupies, he is also driven by the need to "organize actors with sufficient resources" (DiMaggio, 1988: 14). For that matter, two tasks are at hand: one, gaining legitimacy, and the other hand, finding resources.

- Task No. 1: Gaining Legitimacy

The first task of the institutional entrepreneur (as he is to be called[91]) is to substantiate his action and his plan. Legitimacy is a central element of institutions to the extent that institutions loosing their legitimacy are in the process of becoming deinstitutionalised (Oliver, 1992, 1991; Ogata, 2006). At the other end of the spectrum, all new ventures also have a lack of legitimacy (Aldrich and Fiol, 1994; Zimmerman and Zeitz, 2002). It is so crucial that institutional entrepreneurs are even described as "agents of legitimacy supporting the creation of institutions that they deem to be appropriate and aligned with their interests" (Dacin et al., 2002: 47).

Legitimacy is defined as "a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995 : 574). It encompasses notions of trust, credibility and reputation (Aldrich and Fiol, 1994). More than half of the studies analysed deal with this issue at some length. Theoretical papers particularly emphasize this aspect and propose several categories to better understand the creation and growth of this intangible asset.

The 'trick' with this concept is that legitimacy is dual. It is an essential component in acquiring other resources: "legitimacy, a social judgement of acceptance, appropriateness and desirability, enables organisations to access other resources needed to survive and grow. It provides a means to inverse the 'liability of newness'" (Zimmerman and Zeitz, 2002 :414). It allows "resource spaces to be constructed" (Rao, 1998), and is therefore not 'just another resource' (Scott, 1995). But it also requires resources itself to be able to grow (Rao, 1998). Institutional entrepreneurs should build on their own legitimacy and articulate strategies in order to acquire some more (Durand and McGuire, 2005). Legitimacy results from an accumulation process: Zimmerman and Zeitz (2002) argue that there exists a threshold of legitimacy above which the existence of a new venture will be more secure.

Despite the multiple categorisations proposed (Suchman, 1995; Aldrich and Fiol, 1994; Zimmerman and Zeitz, 2002), there is general agreement on two main components of legitimacy: the socio-political and cognitive parts[92]. The two components actually reflect

[91] When referring to an institutional entrepreneur, no study relates failures; rather, when the work of an institutional entrepreneur is depicted, it leads to the transformation or the creation of an institution. The label of institutional entrepreneur is therefore always justified. But an individual or an organisation acting as an institutional entrepreneur can nevertheless fail (ex: Karnoe and Georg, 2005) for various reasons that would need to be categorised.

[92] Two other aspects are worth mentioning: first, the notion of pragmatic legitimacy cited by Suchman (1995). In a nutshell, it reveals the fact that some audiences might legitimize an action because they believe it will have a positive impact on them and because it serves their own interests. We may well consider that pharmaceutical companies validated Turner and Roberts' action as it would facilitate their own work: they would have a unique spokesperson who would ensure that their practices and medical protocols would not be reassessed (Maguire et al., 2004).

the definition of 'institution' as proposed by Scott (1995), as being an intermingling of regulative, normative and cognitive elements.

The cognitive dimension is defined as "knowledge about the new activity and what is needed to succeed in an industry" (Aldrich and Fiol, 1994: 648). It includes presenting a coherent and comprehensive view of the world and of the institution within it (Suchman, 1995). Gaining cognitive legitimacy is also linked to how institutions in the making are often taken for granted (taken to the extreme, this means that no other alternative is considered (Zucker, 1983)), which at the same time, implicitly defines its roles and status (Scott, 1995).

The socio-political side of legitimacy represents "the value placed on an activity by cultural norms and political authorities" (Aldrich and Fiol, 1994: 648). It encompasses regulatory elements - actors or activities would gain this kind of legitimacy if they conform to legislations, rules and standards – and normative ones – legitimacy would increase if the new activity follows norms that are widely accepted (Zimmerman and Zeitz, 2002).

Both types of legitimacy seem to be needed to mobilize support (Aldrich and Fiol, 1994; Suchman, 1995) (even if it has not been empirically asserted). However, no link has been established between a particular component of legitimacy and resource gain. Moreover, it seems that just as needs are different during institutional change, so do the kinds of legitimacy required (Lawrence et al., 2005; Aldrich and Fiol, 1994).

Therefore, strategies must be designed because actors, most of the time, need to be proactive in their quest for legitimacy. Indeed, legitimacy is not inherently 'received' (DiMaggio and Powell, 1983). Strategies are used for the purpose of "strategic legitimation", a terminology that Zimmerman and Zeitz (2002) use to highlight that legitimacy (as a whole) results from strategic actions (should the strategies be emergent or not (Clemens and Cook, 1999)).

To increase socio-political legitimacy, the literature proposes a number of possibilities for action:

- To get the institutional entrepreneur's project sponsored by a legal authority, government, an external and neutral recognised organisation, or a well-known character/expert (Rao, 1994; Garud et al., 2002; Durand and McGuire, 2005; Demil and Bensédrine, 2005; Lawrence, 1999);
- To get the new element tested in contests to illustrate its reliability (Rao, 1994);
- To lobby for social change (Wade-Benzoni et al., 2002);
- To develop coalitions around new identities that would define new structures (Fligstein and Mara Drita, 1996);
- To identify political opportunities, highlight specific issues and problems, and infuse new beliefs, norms, and values in social structures (Rao et al., 2000; Fligstein and Mara Drita, 2001);

Secondly, Zimmerman and Zeitz (2002), investigating the conditions of growth of new ventures, also incorporate the general industry-wide legitimacy as an element to be considered. It includes industry standards, norms and values, or the legitimacy of other members of the industry.

- To introduce measurement tools and create technical norms equivalent to an already-established standard (Déjean et al., 2004).

To gain cognitive legitimacy, strategies available to the institutional entrepreneur include:

- To make it understood that the new element is desirable or appropriate in the existing norm and value system (Rao, 1994; Haveman and Rao, 1997; Maguire et al., 2004);
- To use specific views of the world which define what type of actions are legitimate are what results are the most desirable (Fligstein, 1997);
- To frame the problem in a broader ideological agenda (Holm, 1995);
- To incorporate the new ideas/practices into the existing routines and culture of the organisation (Lawrence et al., 2002; Munir and Phillips, 2005; DiMaggio, 1988; Lawrence, 1999) or to embed the innovation in a familiar design (Hargadon and Douglas, 2001);
- To use the existing dominant ideology as a justification (Powell and DiMaggio, 1991).

- Task No.2 : Acquiring Resources and Support

Beyond legitimacy, the institutional entrepreneur should also attempt to gain support and all kinds of resources. In order to so, he must develop networks or strengthen existing ones through cooperation and association (Leblebeci et al., 2001), and mobilize 'subsidiary actors' (DiMaggio, 1991) in an effort to create a bandwagon effect (Garud et al., 2002). The underlying idea is that 'running in packs' (Van de Ven, 2005) is more effective than running alone.

Strategies to adopt depend on the context of the action (one must take into consideration the existence of tensions, contestations and/or contradictions (Seo and Creed, 2002)), the environment (Zimmerman and Zeitz, 2002), the degree of institutionalisation of the field (Tolbert and Zucker, 1996), the position of the institutional entrepreneur and the life-cycle of the industry/venture (Maguire et al., 2004). There are also different strategies to implement depending on whether the institutional entrepreneur seeks passive or active support from a specific audience (Suchman, 1995). In any case, the institutional entrepreneur should remain flexible and should allow the project to evolve as resources mobilised vary and support is gained (Fligstein, 1997).

To put the strategies into practice, the institutional entrepreneur ought to possess certain social skills (Fligstein, 1997), among which are found the skills of: negotiation (Maguire et al., 2004), bargaining (Dorado, 2005), putting pressure on others (Demil and Bensédrine, 2005), manipulation (Zimmerman and Zeitz, 2002), persuasive argumentation (Maguire et al., 2004), influence and force (Lawrence et al., 2005).

3.3.2 Discourse: an Essential Carrier in the Mobilisation Effort

Mobilisation is a strategy to gain support and resources, including legitimacy, as discussed in the previous section. Mobilisation is oriented towards creating allies, although Dorado (2005) and Lawrence at al. (2005) argue that power and domination might be sufficient in reducing or even eliminating the need to develop coalitions (see also to some extent Demil and Bensédrine, 2005). The strategies presented above are essentially used to set up coalitions. They relay heavily on discourse as a carrier: therefore, they are called discursive ones.

Discourse is an essential means for the institutional entrepreneur. Some authors even state that the work of the institutional entrepreneur is mainly to generate discourse (in a broad sense of the term, including written texts), with the purpose of affecting the social constructions on which institutions lie (Phillips et al., 2004; Maguire et al., 2004). It is judged central to the institutional entrepreneur's efforts, especially when the institutional entrepreneur's field is in reconfiguration and new logics are being introduced (Suddaby and Greenwood, 2005).

The following examples of empirical case studies illustrate that the power of "discourse is the principal mean by which organization members create a coherent social reality" (Mumby and Clair 1997: 181): it is by using discourse that Kodak created "the Kodak moment", changing the way families were interacting with their past and their present moments (Munir and Phillips, 2005); it is the way whales were presented in a positive light in movies that changed macro discourse on the subject (Lawrence and Phillips, 2004); it is with the slogan "Strength Beyond Numbers" that accountants in Canada managed to change their identity (for themselves and their clients) (Greenwood et al., 2002: 64).

- The Main Carrier in Creating New Frames

Institutional entrepreneurship is closely related to language because institutional entrepreneurs promote frames (this terminology is borrowed from the social movement theory): "Institutional entrepreneurs can mobilize legitimacy, finances, and personnel only when they are able to frame the grievances and interests of aggrieved constituencies, diagnose causes, assign blames, provide solutions, and enable collective attribution processes to operate" (Snow and Benford, 1992: 150). Framing is one step in the process of institution building. Framing often refers to Weick's sense-making (1995), to which can be added Gioia and Chittipeddi 's notion of sense-giving (1991). The discursive sense-giving / sense-making strategic activity can refer to theorization " [as] the development and specification of abstract categories and the elaboration of chains of cause and effect" (Strang and Meyer, 1993: 61). Maguire et al. (2002) as well as Greenwood et al. (2002) use their respective case studies to illustrate this step of the institutionalisation process.

They answer to Tolbert and Zucker's call (1996) to better understand how new scripts[93] are conceived, which corresponds to the transition of the process from pre-institutionalisation to full institutionalisation. Theorisation, from theoretical formulation to social movement to institutional imperative (Strang and Meyer, 1993, cited by Greenwood et al., 2002), involves two dimensions: specification, which can be considered the as diagnosis of the failure of the existing institutional set-up, and justification, which consists of substantiating the superiority of the proposed new institutional arrangement. Therefore, the task of the institutional entrepreneur is to both incorporate some existing practices and norms, highlighting the contradictions of the system, and to promote (and justify) new ones to a variety of stakeholders (Maguire et al. 2002, Greenwood et al., 2002). The most striking example of this work is to be found in Fligstein and Mara-Drita's case study (1996): facing an institution in crisis (the European Community system was said to be on the verge of collapse if no major reforms were undertaken), Delors, at the time the president of the European Commission, created a new cultural frame: the Single Market Project. Originally set up as a modest initiative – intentionally, in order to receive more adhesion from single states - it was used by Delors to convince national leaders that projects (various harmonization procedures) followed logically. Other strategies found in the literature include the desire to:

- Infuse the new element with a common sense (Zilber, 2002);
- Build shared social identities which have the potential to bring support (Creed et al., 2002);
- Take the 'champion' role and make efforts converge towards a collective action (Haveman and Rao, 1997);
- Create strategies to establish stable interaction sequences with other organisations (Haveman and Rao, 1997);
- Convince actors of the agenda (Zimmerman and Zeitz, 2002) and of the requirement of a strategic action (Fligstein and Mara Drita, 1996).

Seo and Creed (2002) argue that frames developed by institutional entrepreneurs should not be completely new, otherwise they will not receive enough support, being that they are too far from existing values and norms. Actually, institutional entrepreneurs should select the frame which has the most chance of being accepted (Hardy and Phillips, 1999). The institutional entrepreneur's task is also therefore to align the future frame with existing institutional norms (Haveman and Rao, 1997). The word 'align' underlines the possible difficulties of the task, as it may suppose bargaining and compromising with opponents. This may also cause the institutional entrepreneur to modify or redefine identities: actors joining the coalition, for example, may be transformed by adhering to the new frame (Rao et al., 2000; Creed et al., 2002). The latter is broadly the equivalent of Maguire et al.'s (2002) twofold strategy in the creation of an institution which first component is political bargaining. One difference is that Rao et al. consider that the ones joining the coalition should accept the change of identity (otherwise, they would not join). The second side to Maguire et al.'s strategy is called 'persuasive argumentation': it consists of "assembling

[93] This term is used here as an equivalent to the term 'frame'.

an array of arguments that framed problems and justified the new practices they were promoting in ways that resonated with a variety of different stakeholders to create a broad base of support"(2002 :669).

- Effectiveness of the Institutional Entrepreneur's Discourse: Selecting the Arguments and the Audience

Scholars have identified a number of strategies which make the discourse more effective: discourse is more effective when it is targeted for a selected audience, which implies that arguments are chosen accordingly. This is what Suddaby and Greenwood demonstrated when they identified ways the "Big Five" used to justify the change in the accounting/auditing business (2005). Their study refers to rhetoric: more than a discourse, works targeting rhetoric are interested in the effectiveness of language in achieving defined goals and in changing social order. Rhetoric consists in the art of persuading and thus it has a major impact in an actor's cognition. Holm (1995) analyses the way fish exporters in Norway won over fishermen as their rhetoric brought them government support. Suddaby and Greenwood (2005) show how it is possible to direct the interpretation of change by producing specific rhetoric. Their case study illustrates how various actors involved in a profound institutional change, including the creation of a new organizational form, used different rhetoric based on an interplay of pathos, ethos and logos to justify the change (ontological, historical, teleological, cosmological and value-based).

3.3.3 Creation of Lock-in

The last tool that the institutional entrepreneur may use to institutionalise change is setting up lock-ins[94]. They are defined as "commitment, binding, or restriction."[95] When Edison promoted his vision by setting up the infrastructure for its electricity system (Hargadon and Douglas, 2001), he tried to create a lock-in for the cities in which it was set up. The SMP, promoted by Delors "started as a modest initiative and gathered political momentum, becoming a project that could be supported by all of the states" (Fligstein and Mara-Drita, 1996: 12), could also be qualified of lock-in. The term of momentum refers to it: once political partners were engaged in the process, retreat was less easily possible. The example of Sun Microsystems trying to impose its standard (Garud et al., 2002) is another

[94] We could also refer to the term « irreversibility » used by Callon (1991) in sociology which demonstrates the first socio-cognitive moment when fluidity and openness decrease which may lead to the alignment of actors. In that sense, irreversibilities facilitate the interaction between actors. Irreversibilities are seen as punctuation of technological field evolution. But they also come to constraint actors as they guide them in a certain direction (see also the closeness to path dependence concepts). In economics, lock-in is a well-known term (see David, 1985) and it refers to this last aspect of the phenomenom: lock in situation restraint customers to switch to another product.

[95] lock in. (n.d.). *Dictionary.com Unabridged (v 1.0.1)*. Retrieved November 20, 2006, from Dictionary.com website: http://dictionary.reference.com/browse/lock in

trial to set such a lock-in: when actors have invested time and resources in Java, it is more difficult for them to switch to another program, which de facto induces them to reinforce their engagement towards Java to avoid loosing their investment. Switching costs increase when investments in time, money, competences and/or learning are high. This notion is well known for scholars interested in new product development.

4 Conclusions

Our argument is organised around three major parts that we will link them to the work that follows. These points emerged from the following statement of facts. First, existing work has been under-estimating the quantity and the diversity of the work achieved by the institutional entrepreneur: indeed, the institutional entrepreneur is often presented as a hero, even if it is in an implicit way. On the contrary, the mobilisation effort encompasses several speakers and actors who work side by side with the institutional entrepreneur.
Second, the mobilisation process supported by the discourse is not thoroughfully documented: neither the production of the vision nor its communication/diffusion are really detailed i.e. the selection of the audience, the sequence in which they are reached, the construction of networks and of borders between them and the construction of the arguments.
Last, as the previous paragraph devoted to lock-in illustrates, lock-in building as such has been neglected, even if it is implicit in many studies.

In a nutshell, it is the day-to-day activities of the institutional entrepreneur that have been undervalued. This thesis aims at filling this gap.

4.1 The Institutional Entrepreneur: An Implicit Hero

Though not labelled as a hero, the institutional entrepreneur is implicitly seen as one. Case studies emphasize this aspect using vocabulary such as: the opportunity he grasps, the shaping of his environment (Lawrence, 1999), the challenges he rises to, the creativity he demonstrates, the work he achieves, etc.
The major issue here is that the literature tends to mix the under same label two different tasks: implementing new ideas vs. creating new ideas, but the work entailed in each situation is different. There is no agreement on which side the institutional entrepreneur stands. The closest work that has been undertaken would be associated with Beckert's work (1999), in which he tries to differentiate between entrepreneur and manager.

However, the view of the institutional entrepreneur as a hero is misleading, because the complexity of the task is not often emphasized. This is a drawback of a field of research that is not yet mature, and there is now a need to increase comparisons between monographs and to better theorize the institutional entrepreneur's action, depending, for instance, on the conditions of the institutional field, such as its maturity, or conversely, its state of emergence. The institutional entrepreneur seems to be the one carrying all the strategies and actions; whichever the nature of the field, mature or emerging, shadows (Latour and Woolgar, 1979) act to support him: in the former situation, institutions are so strong that much work is needed to embark support, because change induces uncertainty which actors are uncomfortable with. For an emerging field, the work is not much easier.

Based on our fieldwork, we cannot answer to our own call for more comparison and theoretical work. However, as we work to unveil the complexity of the work of the institutional entrepreneur, we aim specifically to demystify 'the-institutional-entrepreneur-as-a-hero' myth implicitly found in the literature. The explanation of this inferred view of the institutional entrepreneur rests on the fact that only specific aspects of his work are dealt with in case studies, which inherently reduces the possibilities to encompass its complexity. Secondly, as it was noticed in the literature review, case studies mostly focus on a single level of analysis, which again limits the density that can be touched upon. Thirdly, this myth may also come from the definition of the institutional entrepreneur which scholars use as a starting point, and that influences what and how situations are studied.

Chapter 7 will come back most particularly on the issue of the institutional entrepreneur as a hero.

4.2 Acquiring Resources with Discourse

The literature review highlights the crucial role of discourse in the action of the institutional entrepreneur, especially in the creation of new frames. Studies in the field use terminologies such as "convincing" and "justifying". As for now, rhetoric and narratives have been exploited with this purpose: rhetoric is used to gain the greater effectiveness from arguments; narratives are developed to link events and build chains of causal relationships. However, no work proposes to uncover the process of how conviction and justification unfold across time and space. How discourse is built both in relation to its content and its context has been a subject which received little attention. Chapter 5 (in relation to content) and Chapter 7 (in relation to the context) deal with these aspects in details.

Legitimacy issues have been brought up in a section separate from discourse. It is also because they do not appear in the literature either, despite the fact that many strategies for gaining cognitive legitimacy entail discursive ones (Fligstein and Mara-Drita, 1996; Maguire et al., 2004; Lawrence and Phillips, 2004). Comparatively, using rhetoric (Suddaby and Greenwood, 2005; Greenwood et al., 2002) is a strategy used by actors to convince others of their position, and thus, to illustrate in a way their legitimacy. Gaining legitimacy and discourse are therefore closely intermixed and each is a resource for and a result of the other. The gap between the two is revealed here; how is it possible to gain legitimacy and convince, if it only, or at least mostly, rests on discourse? Chapter 5 tries to clarify this point linking discourse to legitimacy.

4.3 And the Sequence of the Mobilisation Process?

Up until now, the question of how a new institution is created has been raised using a large array of perspectives: it entails legitimacy building, and allies' mobilisation and

discourse usage to carry the message. What has not yet been raised is the temporality of the process: when are actors approached to join the coalition? Do arguments to rally them evolve, and do they differ over time?

Most of the case studies deal with these aspects more or less explicitly. It is implied that change is induced from within the organisation to outside of it, from the centre to the periphery (DiMaggio, 1991). The model presented by Aldrich and Fiol (1994) is geared towards this direction, and it is actually the only piece of work cited in the literature that has devoted some space to it. The two authors, working on the emergence of an industry, consider that the new venture should build enough legitimacy to finally reach the institutionalisation stage. They propose socio-technical levels that can be interpreted as layers that an entrepreneur has to go through in order to convince actors to follow him in the emergence of a new industry. These levels are: organization, intra-industrial, inter-industrial and institutional. Scholars acknowledge that each new venture faces different environmental conditions and forces (Zimmerman and Zeitz, 2002), but there is a general shared agreement on the fact that the institutional entrepreneur will start close to where he is and will spread out in time. This scheme is implicitly and partially found in Greenwood et al.'s (2002) empirical study: the case of the introduction of a new business line in the accountants' life relates that institutional change first entailed work at the professional level before the business' identity modified; it then seemed that the accountants had to work with law firms as well as with their clients about this new positioning. The situation is relatively similar in Holm's study (1995), when fishermen debated first internally before bridging the gap when trying to put their issue on the national political agenda.

The whole process described by Aldrich and Fiol (1994) is never fully covered, but studies analyse in-depth what happens at one level (organisational (ex: Zilber, 2002; Lawrence et al., 2002) or intra-industrial (ex: Garud et al., 2002; Durand and McGuire, 2005)) with glimpses of constraining elements or contexts. The lack of perspective on the whole process is a major drawback, and it is impossible to follow sequentially what the various stages are. Is there even a recurring sequence in the process? When and how are protagonists, antagonists, and the uncommitted audience handled (but potentially mobilised) (Hunt, 1994)?

The section devoted to this issue highlights the lack of specific work on this aspect of the institutional entrepreneur's work. On top of the limits inherent to monographic case studies that have already been mentioned, the most important drawback is that the focus remains fixed on the result of the change, rather than on the process of institutional change, and can be used as an explanation of the absence of the issue in the research fields. The lack of methodological tools to follow the process is another possible reason.

We shall mobilised Lawrence and Suddaby's (2006) suggestion to use discourse analysis or the actor-network theory to explore more in depth the questions that were raised.

Partie 2 – Outils de suivi des pratiques

Chapitre 3 - Eléments de méthodologie

Ce chapitre, relativement court par rapport aux autres chapitres, vise à présenter la méthodologie employée dans le recueil des données. Il s'attarde également sur des éléments de contexte qui eurent des conséquences sur la conduite du projet de la thèse comme les conditions d'accès au terrain ou qui participèrent à constituer le faisceau d'hypothèses. Les éléments qui y sont présentés ne comprennent pas les procédures d'analyse utilisées. Ces dernières sont néanmoins exposées, en fonction des besoins, dans les chapitres suivants.

1 Description des conditions de la thèse

Le travail de thèse s'est inscrit dès le départ dans le cadre de deux contrats de recherche. Ceux-ci sont brièvement évoqués parce qu'ils nourrirent largement la réflexion ici relatée.

Le premier, Minatec, contrat de 3 ans avec le CEA-Grenoble, débute en 2003. Il s'attèle à comprendre les transformations à l'œuvre dans le pôle électronique grenoblois, lors du passage à l'échelle nanométrique. Trois niveaux d'analyse sont mobilisés pour aborder un maximum de situations :
Les sociologues du CRISTO[96] de l'Université Pierre Mendès France de Grenoble (UPMF) s'attachent par des méthodes ethnographiques à comprendre l'impact du passage à l'ère du nanomètre dans les façons de travailler au laboratoire.
Les gestionnaires du laboratoire GAEL[97]/UPMF, du LATTS[98]/ENPC et de l'Ecole de Management de Grenoble s'intéressent, quant à eux, à la gestion de projets. Leur objectif est d'anticiper des situations difficiles avant la mise en place à plus grande échelle d'un programme au sein du CEA-Grenoble, la RTB (Recherche Technologique de Base).
Les chercheurs du LATTS , à l'échelle de l'organisation, visent à comprendre l'évolution du positionnement du CEA-Grenoble dans l'ensemble du contexte grenoblois ; dimension à laquelle cette thèse se rapporte.
Si la répartition des taches entre les équipes de recherche est définie de la sorte, les travaux incluent néanmoins une forte dimension collective permettant d'appréhender les transformations sous de multiples aspects. Cette thèse s'enrichit donc de tous les éléments abordés dans ce contrat et bénéficie d'un très large accès au terrain du CEA-Grenoble.
Le fait que la thèse s'insère dans ce contrat financé par le CEA-Grenoble ouvre de nombreuses portes au sein même du CEA : l'accès aux archives de son directeur ou des chefs de projets de Minatec est complètement ouvert et les conditions d'obtention d'entretiens sont largement facilitées. Cette commande de la direction du CEA-Grenoble et de Jean Therme apporte une légitimité à cette recherche en science sociale, qui bien que parfois mal comprise, bénéficie d'un allant de curiosité des ingénieurs ou des partenaires politiques de Minatec. A l'extérieur du CEA, le rattachement à ce contrat de recherche

[96] CRISTO : Centre de Recherches Innovation Socio-Technique et Organisations industrielles
[97] GAEL : Laboratoire d'Economie Appliquée de Grenoble
[98] LATTS : Laboratoire Techniques Territoires et Sociétés.

permet donc de toucher les partenaires de Minatec, universitaires ou acteurs de la sphère politique locale ou nationale.

Le second contrat de recherche, NanoDistrict, est financé pour 18 mois dans le cadre du réseau européen d'excellence PRIME[99]. Il réunit des chercheurs des laboratoires ci avant mentionnés (GAEL/UPMF et LATTS/ENPC), de l'Observatoire français des Sciences et des Techniques, des sociologues de l'Université de Twente aux Pays-Bas, des économistes de l'Université de Sant'Anna et des politologues de l'Institut Universitaire Européen de Florence. L'objet principal du projet consiste à vérifier l'hypothèse d'agglomération des acteurs sous forme de « districts scientifiques » (ainsi nommés en référence aux districts industriels de Marshall, 1890) dans le cas des nanotechnologies. Le premier sous-projet s'attache à quantifier sur base d'analyses bibliométriques l'identité et la localisation des acteurs scientifiques (articles) et technologiques (brevets) du monde des nanosciences et technologies. Le deuxième se penche sur deux études de cas, Grenoble et Twente (Pays-Bas) dont les processus d'émergence sont au cœur des débats. Un troisième sous-projet se focalise sur la pertinence de comparaison nanotechnologies / biotechnologies pour en tirer des leçons quant aux modèles économiques qui se déploieront. Une fois encore, le travail est réparti selon les compétences et intérêts des uns et des autres. Le travail de thèse trouve tout naturellement sa place dans le deuxième sous-projet. La comparaison approfondie entre le centre de Grenoble et celui de Twente met en exergue un ensemble de caractères des processus de construction . Les ressemblances sont les plus intéressantes de par les différences géographiques, organisationnelles, institutionnelles, scientifiques et technologiques qui existent entre les deux sites. La comparabilité des cas sur les échelles géographiques et la temporalité du processus de mobilisation pousse davantage les recherches autour de ces aspects[100]. Les différences, notamment au niveau des technologies sous-jacentes i.e. approche top-down[101] à Grenoble et bottom-up à Twente, génèrent des réflexions sur la relation entre technologies et organisations des acteurs.[102]

2 Une approche initialement qualitative.

M'attachant aux mécanismes que l'entrepreneur institutionnel emploie dans sa quête pour imposer sa vision, les méthodes de recherche sont logiquement davantage orientées sous un angle qualitatif. Conger (1998) soutient d'ailleurs que ce genre de méthodologie doit être utilisé pour des sujets ayant une forte composante subjective et dynamique par nature. Au-delà de l'objet de recherche (le leadership) auquel s'attache Conger, cette justification est tout aussi pertinente pour des recherches portant sur les motivations ou les visions qui

[99] PRIME : Policies for Research and Innovation In the Move towards the European research area
[100] Ce point est tout particulièrement l'objet du chapitre 6.
[101] La fabrication de nano-objets peut être envisagée selon deux méthodes : en divisant de la matière de la taille du micromètre à plusieurs reprises pour obtenir de la matière à l'échelle du nanomètre ; ou à l'inverse, en partant d'atomes et en les assemblant.
[102] Ces éléments trouvent leur place dans l'introduction de cette thèse ainsi que dans le chapitre 5.

sont hautement subjectives et sensibles à la variation temporelle. Dans un second temps, l'importance donnée à l'observation a renforcé ce choix. Néanmoins, pour limiter le biais auquel toute recherche de type qualitatif est soumise, un effort tout particulier est mis sur la détermination d'indicateurs capables de mesurer dans le temps l'évolution du processus.

2.1 Le recueil des données

La période étudiée recouvre un peu plus de deux années d'octobre/novembre 1999 – période qui précède la première présentation du projet à la hiérarchie du CEA au 18 janvier 2002 – date de la signature de la convention Minatec. Néanmoins, des données de contexte sont nécessaires à la compréhension du phénomène Minatec tant d'un point de vue technique qu'historique.

Le travail de terrain est amorcé par des entretiens exploratoires avec les partenaires de Minatec. Le but principal de ces entrevues est d'obtenir l'accès aux archives de chacun afin de recueillir les traces de la construction de l'objet « Minatec ». Néanmoins, en plus de la défiance de certains acteurs, il est très vite apparu qu'aucun des fondateurs de Minatec[103], y compris le chef de l'équipe projet, ne dispose de bases stratégiques capables de reconstruire le « pourquoi » d'un tel projet. Des éléments expliquant le « comment » sont disponibles dans les archives de J-F. J-F. Veyrat, chef de l'équipe Minatec, mais ni l'Institut National Polytechnique de Grenoble, ni le Conseil Général, ni le Conseil Régional ou la ville de Grenoble ne possèdent de données tangibles sur la construction de Minatec. Tous pointent du doigt un seul et même acteur, Jean Therme, directeur du CEA Grenoble pour ce qui touche à la stratégie sous-jacente à l'émergence du pôle d'innovation. Tous d'ailleurs, ce qui est suffisamment rare pour le noter, en reconnaissent à J.Therme la paternité.

2.1.1 Les archives stratégiques de Jean Therme [104]

Le travail d'archives s'est donc focalisé sur les archives de Jean Therme après avoir exploré les archives « pratiques » de J-F. Veyrat sur les aspects techniques et juridiques de la construction.

[103] Ceux-ci sont identifiés par la convention MiNaTec datée du 18 janvier 2002

[104] Les chapitres 4 et 6 détaillent davantage ce paragraphe. Le chapitre 4 revient sur l'ensemble des données qu'il est possible d'extraire des présentations, tandis que le chapitre 6 s'attache davantage à l'exploitation des données, notamment par le logiciel Alceste.

- Les présentations PowerPoint™ comme mode et outil de communication stratégique

L'élaboration de la stratégie derrière Minatec se trouve dans un ensemble de 102 présentations qui s'échelonnent de fin 1999 à début 2002 (la signature de la convention cadre Minatec). La liste de ces présentations est indiquée en Annexe 1.

Pourquoi ne pas se baser sur des archives classiques tels des comptes rendus de réunions, rapports ou notes stratégiques etc. pour suivre l'émergence du pôle ? De tels documents n'existent tout simplement pas chez le porteur de projet. Jean Therme lui-même n'en rédige et n'en requièrt que peu de ses collaborateurs. Le format « présentation PowerPoint™ » constitue donc un mode de travail pour cet acteur. Deux exemples précis appuient cet argument : après un an de travail, les conclusions du projet « Léti 2000 » présentées au directeur du centre et aux instances nationales du CEA concernant la vision stratégique du Léti à 5-10 ans se présentent sous la forme d'un résumé de 2 pages, d'une note de 8 pages et d'un jeu de 40 transparents. Le second exemple est le bilan du contrat de trois ans « Minatec » présenté et accepté sous forme d'un jeu de 10 transparents.

Les présentations de J.Therme ne sont donc pas des présentations au sens classique du terme, elles constituent le témoin de l'évolution du projet. Elles peuvent ainsi :

- tester et/ou faire discuter: l'idée proposée remporte-elle l'adhésion de l'auditoire ? Quelles modifications sont nécessaires ?
- faire voir : un point est affirmé et présenté afin que le destinataire puisse se l'approprier,
- traduire un consensus : une décision a été prise concernant un point précédemment évoqué dans la catégorie « tester/faire discuter ».

- Construction des bases de données des présentations et des transparents

Le recueil de ces 102 présentations impose de multiples séjours à Grenoble dans les locaux du CEA. Les présentations de J.Therme sont classées dans le bureau de son assistante. Cet agencement permet d'une part d'interagir avec l'ensemble du personnel de la direction de façon informelle et d'autre part d'observer l'organisation du département.

Les présentations sont récapitulées en Annexe 1. Les informations relatives au contexte des présentations : date, titre, personnes présentes y sont également incluses. Lorsque ces détails viennent à manquer, les assistantes de Jean Therme permettent de récupérer ces données à l'exception de deux présentations dont des renseignements restent absents.

Au total, 955 personnes ont assisté aux présentations entre 1 et 21 fois. Les audiences sont classées en fonction de l'origine organisationnelle (université, centre de recherche publique, industrie, autorités publiques, organisations de support, ou autres) et géographique (locale/régionale, nationale, européenne, monde).

Chaque transparent reçoit un code déterminé par la ligne et la colonne dans laquelle il se situe. Ainsi celui qui est recopié dans la cellule B25 reçoit comme identifiant ce même code (l'Annexe 2 présente les étapes du recueil des données et la constitution de la base de données des transparents). Les diapositives ne sont pas renouvelées à chaque présentation et peuvent être réutilisées. Dans ce cas, elles sont identifiées par le code précédemment défini. Un transparent est reconnu en fonction du corps du texte[105] : en effet, les titres peuvent changer, mais le contenu reste identique. On ne tient pas compte de cette différence car on considère que les titres sont utilisés pour fluidifier la présentation.
Il existe également des transparents résultant de la fusion de plusieurs d'entre eux. Dans ce cas, ils sont identifiés et reçoivent un nouveau code lors de leur première apparition.

760 transparents dits « de base » sont ainsi définis et classés. Chacun d'entre eux est caractéristisé de la façon suivante :

- « date de naissance » : première apparition
- « date de mort » : dernière apparition
- nombre total d'utilisation
- présentations dans lesquelles le transparent apparaît.

Les chapitres suivants, en tenant compte de ces éléments, feront référence à la « vie des transparents ».

La diapositive n'est jamais présentée seule, elle appartient à une présentation faite pour un destinataire particulier. Son arrangement au sein de l'exposé donne son sens à la présentation. Les transparents sont utilisés les uns avec les autres, et pour reprendre mon image, ils constituent ensemble des phrases. Si au total, les 102 présentations sont composées de 3331 transparents, elles sont en réalité un ré-arrangement de 760 transparents de base (établis d'après la procédure précédente).

La construction des présentations et des transparents est régie par un principe strict de séparation des taches, quasi taylorien, entre la conception et la réalisation. Ce processus systématique appelé « fabrique de transparents » est décrit dans le Chapitre 7.

La diapositive est un outil délicat car elle doit en un minimum de mots traduire une idée, ce qui rend chaque mot précieux. Il faut à l'auteur avoir une idée suffisamment claire de son objectif pour que son outil soit efficace. Le transparent se compose de texte ou de graphiques. Ceux-ci sont eux-mêmes composés de mots – le graphique indique les liens forts qui unissent les mots et c'est pourquoi, même dans cette situation, une analyse textuelle est tout à fait pertinente (Chapitre 7).

[105] Ceci implique donc qu'un transparent sans corps, c'est à dire constitué uniquement d'un titre n'est pas ici considéré comme un transparent à part entière.

2.1.2 L'agenda de Jean Therme

Pour re-construire le travail de J.Therme, les présentations ne peuvent constituer la seule source d'information. En effet, elles retracent le côté formel de l'interaction tandis que le côté informel est négligé. Les agendas de J.Therme sont mobilisés pour faire face à ce problème. Les années 1999-2002 sont scrutées ; chaque rencontre est relevée dans une base de données. Le but de la visite a été de déterminé avec l'aide de Laurence Nisin, son assistante. Ainsi, il est possible de cofifier l'ensemble des acteurs rencontrés au sujet de la construction de Minatec. Fait surprenant, mis à part les entrevues avec l'équipe projet Minatec, l'ensemble des acteurs inscrits dans l'agenda le sont également dans la base de données des participants aux présentations.

2.1.3 Les conventions Minatec

A partir de septembre 2001, date de l'accord de principe des autorités publiques territoriales et de l'Administrateur Général du CEA pour financer le projet, la convention-cadre de Minatec est rédigée. Celle-ci reprend les grands principes d'existence du pôle et lie contractuellement les signataires. Avant d'aboutir au document final, 13 versions provisoires ont été retrouvées au Conseil Général de l'Isère. Des différences notables existent entre les versions, notamment la disparition complète du futur mode de gouvernance du pôle dans la version finale du document.

2.1.4 Les entretiens

Les entretiens se sont déroulés d'abord auprès des ingénieurs et scientifiques afin de mieux comprendre l'objet technique « nanotechnologies ».
Parallèlement les signataires de la convention Minatec ont été contactés (INPG, Mairie de Grenoble, Conseil Général et Régional, cabinet des commissaires européens) et rencontrés quand cela fut possible (le détail des entretiens est indiqué en annexe).
Divers membres de l'environnement grenoblois comme le président de l'université de Grenoble, des membres des réseaux implantés sur place, des scientifiques du CNRS ou le président de la zone d'activité technologique ont également été sollicités dans le but de comprendre leur (non) implication dans le projet.
Enfin, un ensemble d'entretiens informels a eu lieu lors du travail d'archives tant avec Jean Therme qu'avec ses assistantes, les membres de l'équipe projet et des membres du Léti.

Généralement les entretiens ont duré entre 1h et 1h30 (sauf A.M. Comparini, 20 min) et se sont déroulés en face-à-face (sauf avec G.Vianes et J.Schmitt). Tous les membres du CEA-Grenoble de cette liste ont été rencontrés entre deux et quatre fois.

Tableau 1 Liste des entretiens semi-directifs

Noms	**Fonctions et organisation**	**Objet principal de la rencontre**
Robert Baptist	Scientifique, CEA-Grenoble – responsable de la RTB	- Déploiement de la RTB
Patrick Boisseau	Responsable Nano2Life, Grenoble	- Positionnement des biotechnologies dans Minatec
Jacques Chevallier	Membre du comité de pilotage Minatec – AEPI, Grenoble	- Déploiement de Minatec
Anne-Marie Comparini	Présidente du Conseil Régionale de Rhône-Alpes	- Financement de Minatec - Rôle de la région dans Minatec
Florence Cristallini	Assistante de Jean Therme	- Construction des présentations de J.Therme
Hervé Fanet	Chercheur, responsable programme CEA-Léti	- Construction des objets techniques
Jean-Marc Fedeli	Ingénieur CEA-Léti	- Construction des objets techniques dans le cadre de la RTB
Eric Fribourg Blanc	Co- responsable OMNT, Grenoble	- Déploiement des nanotechnologies. - Positionnement de l'OMNT dans Minatec
Claude Gaubert	Directeur adjoint INPG, Grenoble	- Origines et déploiement de Minatec - Rôle de l'INPG
Dominique Grand	Directeur des relations avec les collectivités territoriales CEA-Grenoble	- Historique du CEA-Léti dans le CEA-Grenoble et de l'équipe Minatec
Jean-Charles Guibert	Directeur de la valorisation CEA-Grenoble (membre de l'équipe Minatec)	- Rôle de l'équipe Minatec - Positionnement de Minatec par rapport à d'autres centres dans le monde
Louis Laurent	Agence Nationale de la Recherche, responsable du département matériaux et technologies de l'information, Paris	- Carte des nanotechnologies
Laurence Nisin	Assistante de Jean Therme	- Déploiement de Minatec compléments sur les archives - Divers
Jean-Louis Robert	Directeur de Recherche CNRS, responsable du laboratoire de photonique et nanostructures, Marcoussis	- Carte des nanotechnologies
Stephan Roche	Scientifique, CEA-Grenoble – université Jean Fourier Grenoble	- Carte des nanotechnologies - Construction des objets techniques dans le cadre de la RTB
Jacques Schmitt	Responsable Etudes, Grenoble Universités, Grenoble	- Rôle des universités dans le pôle grenoblois (par téléphone)
Michel Soutif	Chercheur retraité, université Jean Fourier, Grenoble	- Histoire de Grenoble
Christian de Tassigny	Scientifique, CEA-Grenoble	- Histoire du CEA-Grenoble
Jean Therme	Directeur CEA-Grenoble	- Déploiement de Minatec - Divers
François Triozon	Doctorant CEA-Grenoble	- Construction des objets techniques dans le cadre de la RTB - Historique de l'électronique
François Vacherand	Chercheur, CEA-Léti	- Construction des objets techniques
Jean-François Veyrat	Directeur de l'équipe Minatec, Grenoble	- Déploiement technique de Minatec
Gilbert Vianes	Chargé de Mission, Conseil Général d'Isère (par téléphone)	- Implication du Conseil Général dans Minatec - Evolution des conventions

2.2 Utilisation des différentes sources d'information

Le tableau 2 présente l'utilisation des sources par chapitre.

Tableau 2 Utilisation des sources par chapitre

Type de matériau utilisé	**Caractéristiques**	**Chapitre dans lequel le matériau est utilisé**
Entretiens		
	J.Therme	Chapitres 5, 6 et 7
	Assistantes de Jean Therme	Chapitres 4, 5, 6 et 7
	Equipe Minatec	Chapitre 5
	Autorités publiques locales et régionales	Chapitre 5
	INPG CNRS Réseaux européens Université de Grenoble Chercheurs et ingénieurs	Chapitre 5 Chapitre 6 Chapitre 1 Chapitre 1 Chapitre 6
	Autres AEPI M Soutif	Chapitre 1 Chapitre 3 Chapitre 1
Observation		
	JT	Chapitre 7
	Assistantes	Chapitre 7
Archives		
	J-F. Veyrat	Chapitre 6
	J Therme	Chapitre 6
	CGI	Chapitre 6
Autres		
	Internet, ouvrages et rapports	Chapitre 1 Chapitre 5

3 Conclusion

Ce chapitre a présenté le contexte des recherches effectuées ainsi que l'utilisation des données recueillies pour permettre de répondre aux questions soulevées dans les chapitres précédents. Des méthodes classiques d'entretiens qualitatifs, de collecte de données secondaires et de travail dans les archives ont été utilisées pour constituer la base de données sur laquelle s'appuie la thèse.

Il faut néanmoins préciser qu'étant donné les caractéristiques des archives, qui constituent le cœur des sources d'informations, une méthodologie plus originale a été mise en œuvre pour supporter les hypothèses de travail. Il est apparu important d'en préciser les détails. Ainsi, le Chapitre 4 introduit le lecteur à plus de détails concernant la base de données des transparents et invite plus généralement les chercheurs en sciences sociales à tester de nouvelles méthodes d'analyse face aux défis posées par les nouvelles façons de travailler des acteurs avec l'accroissement des technologies de l'information et communication.

Annexe 1 – Liste des présentations PowerPoint™

Tableau 3 – liste des présentations effectuées par Jean Therme

	Titre de la présentation	Date	Destinataire(s)	Numéro de collecte
1	Les Bio-puces ou la recontre de la microélectronique et des biotechnologies	10/12/1999	R Barre	44
2	Stratégie d'évolution du Léti	31/01/00	INPG	1
3	Stratégie d'évolution du Léti - projet de pôle d'innovation en M et NT	23/2/2000	conseil d'administration du CEA	2
4	Evolution du Léti et projet de pôle d'innovation en micro et nanotechnologies	16/03/00	PMT Léti (Plan Moyen Terme)	3
5	Evolution du Léti et projet de pôle d'innovation en micro et nanotechnologies	22/03/00	Ministère de la recherche et de l'enseignement supérieur	4
6	projet de pôle d'innovation en micro et nanotechnologies	23/03/00	Mairie de Grenoble	5
7	Evolution du Léti et projet de pôle d'innovation en micro et nanotechnologies	13/04/00	COMET (Comité d'établissement CEA-Grenoble)	102
8	projet de pôle d'innovation en micro et nanotechnologies - Grenoble/Polygone scientifique	18/04/00	Sitelesc	6
9	projet de pôle d'innovation en micro et nanotechnologies	28/04/00	Conseil Général	7
10	projet de pôle d'innovation en micro et nanotechnologies	05/05/00	Conseil Régional	8
11	"business plan"du pôle d'innovation en micro et nanotechnologies / Projet	9/5/2000	Administrateur Général CEA	25
12	Etat d'avancement du projet de pôle d'innovation en micro et nanotechnologies	11/5/2000	Porteurs de Minatec	26
13	the future of Léti and the projected innovation centre for micro et nanotechnologies	18/05/00		9
14	Evolution du Léti dans le cadre du projet de pôle d'innovation en micro et nanotechnologies	18/05/00	Office parlementaire d'évaluation des choix scientifiques et technologiques	10
15	the projected innovation centre for micro et nanotechnologies	25/05/00	Commissaire européen Busquin	11
16	projet de pôle d'innovation en micro et nanotechnologies	29/05/00	CCI	12
17	projet de pôle d'innovation en micro et nanotechnologies	31/05/00	Office Parlementaire pour le rapport sur les grds équipements de la rech publique et privée en France	13
18	projet de pôle d'innovation en micro et nanotechnologies	13/06/00	COMET	14
19	Evolution du Léti et projet de pôle d'innovation en micro et nanotechnologies	19/06/00	Ministère de la recherche	15
20	projet de pôle d'innovation en micro et nanotechnologies	20/06/00	CGI Intercommission	16
21	Pôle d'innovation en micro et nanotechnologies actions prioritaires des plateformes	21/06/00		27
22	projet de pôle d'innovation en micro et nanotechnologies - site du polygone scientifique de G	26/06/00	Communauté de Communes Métro	17

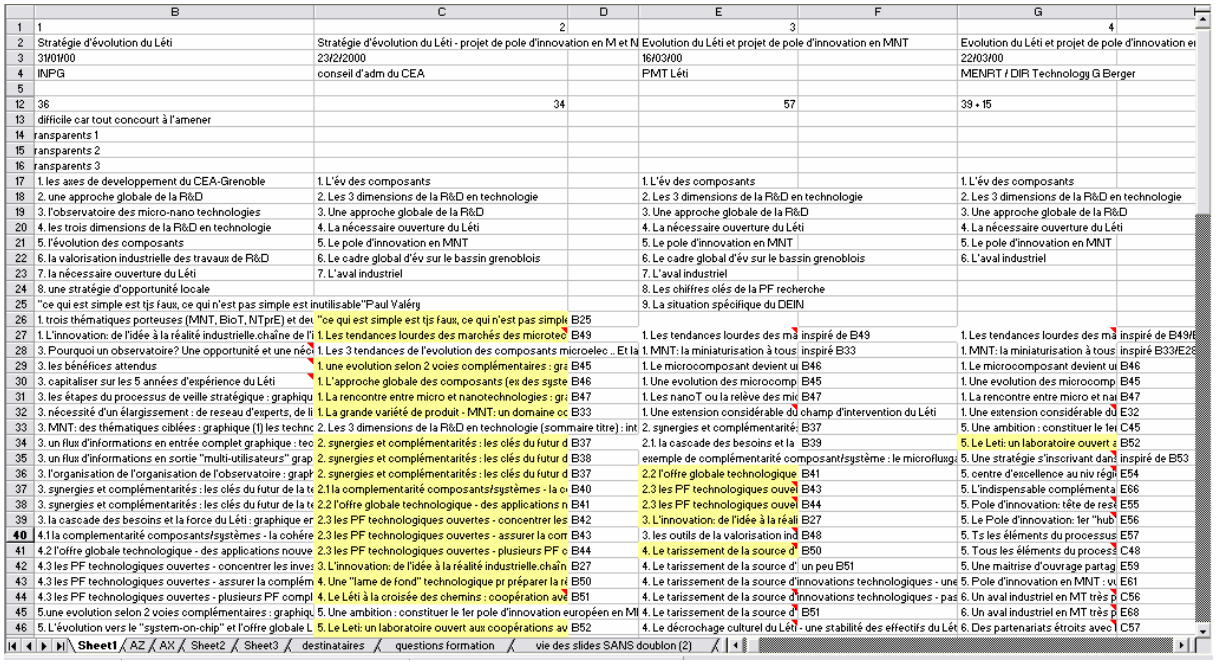
	Titre de la présentation	Date	Destinataire(s)	Numéro de collecte
23	Evolution du Léti et projet de pôle d'innovation en micro et nanotechnologies	27/06/00	Journée start-up	18
24	*Non renseigné*	28/06/00	Préfet Rondepierre	19
25	*Non renseigné*	29/06/00	Personnel Léti Grenoble	20
26	*Non renseigné*	30/06/00	ATMEL	21
27	*Non renseigné*	5/7/2000	Personnel Léti Saclay	22
28	projet de pôle d'innovation en micro et nanotechnologies	6/9/2000	Conseil Général	23
29	Présentation du pôle micro et nanotechnologies aux labos de recherche amont	8/9/2000	Collectivités locales	24
30	Pôle d'innovation en micro et nanotechnologies - Site du polygone Scientifique / Grenoble - Groupe de travail CEA-INPG-Collectivités	12/10/2000	Ministère de la recherche	28
31	réorganisation du CEA	19/10/00	COMET	29
32	Evolution du Léti et Pôle d'innovation en micro et nanoTechnologies	24/10/00	CEA	30
33	the microelectronics technology challenges: limits and alternatives Towards a new R&D model	7/11/2000	IST Nice	31
34	Pôle d'innovation en micro et nanoechnologies - Site du polygone Scientifique / Grenoble - Groupe de travail CEA-INPG-Collectivités	9/11/2000	Ministre de la recherche	32
35	innovation and start-up in the field of technologies for NTIC	20/11/00	les Assises de l'innovation - 2nd european forum of innovative enterprises	33
36	la recherche en technologie microélectronique: retour à la physique	21/11/00	Académie des Sciences	34
37	innovation Center for micro and nanoTechnologies - polygone Scientifique Site / Grenoble - CEA working group -INPG-Communities	21/11/00	COMET	35
38	Xerox	27/11/00	Xerox	36
39	La recherche en technologie microélectronique: retour à la physique … ou la contribution du CEA à un enjeu majeur de la nouvelle économie	28/11/00	Direction du CEA - Presse	37
40	Réorganisation au CEA-Grenoble Projet	6/12/2000	Direction de la Recherche Technologique (DRT) CEA	38
41	Réunion d'information sur le pôle d'innovation Minatec	6/12/2000	Leti réunion d'information	39
42	Louis Néel. Des idées d'hier … porteuses d'avenir	6/12/2000	Retraités CEA et nouveau personnel CEA	40
43	pôle d'innovation en micro et nanoTechnologies - Site du polygone Scientifique / Grenoble - Grpe de travail CEA-INPG-Collectivités	19/12/00	AEPI	41
44	Evolution du Léti dans le cadre du pôle d'innovation en micro et nanotechnologies	20/12/00	CORES 2000	42
45	Réorganisation du CEA-Grenoble	21/12/00	COMET	43
46	Les Bio-puces ou la rencontre de la Microélectronique et des Biotechnologies	12/1/2001	INPG	45
47	Réorganisation du CEA-Grenoble - Pourquoi changer?	15/01/01	Assemblée Générale des Unités Support du CEA-Grenoble	46
48	Pôle d'innovation en micro et nanotechnologies - Site du polygone Scientifique / Grenoble - Groupe de travail CEA-INPG-Collectivités	16/01/01	Club des Ambassadeurs/AEPI	47

	Titre de la présentation	Date	Destinataire(s)	Numéro de collecte
49	Le CEA-Grenoble - une nouvelle organisation au service d'une nouvelle stratégie	24/01/01	Tout personnel CEA-Grenoble	48
50	La collaboration Léti-LIST	29/01/01	Séminaire DRT	49
51	les 3 programmes structurants du CEA-Grenoble	15/02/01	Administrateur Général CEA	50
52	Programme structurant : pôle d'innovation Minatec	15/02/01	Administrateur Général CEA	51
53	du "PMT Léti" au "Journées de réflexion stratégique du Léti Grenoble"	20-21-22/03/01	PMT Léti (Plan Moyen Terme)	52
54	Le Léti en chiffres: bilan et perspectives	20-21-22/03/01	PMT Léti (Plan Moyen Terme)	53
55	Programme structurant: pôle d'innovation Minatec	29/03/01	Comité Consultatif Régional	54
56	pôle d'innovation Minatec: bilan et perspectives	17/04/01	Toutes collectivités locales (CR, CG, mairie de Grenoble)	55
57	Léti - l'innovation au service de l'industrie	17/04/01	Léti	56
58	Léti - l'innovation au service de l'industrie	18/04/01	Léti	57
59	Le CEA-Grenoble "centre pilote" de la recherche technologique et de sa valorisation industrielle	24/04/01	COMET	58
60	Le CEA-Grenoble - Une nouvelle organisation au service d'une nouvelle stratégie	25/04/01	DRIRE	59
61	Présentation du Pôle d'innovation Minatec	14/05/01	Ville de Grenoble	60
62	Le CEA-Grenoble dans le programme INERA (Iniatiatives Nouvelles Energies RA)	mai/2001	COMOS	68
63	Assemblée Générale du DOPT	7/6/2001	Assemblée Générale DOPT	61
64	Présentation du pôle d'innovation Minatec	8/6/2001	Les Elus locaux et régionaux	62
65		11/6/2001	SIMULOG	63
66	Présentation du pôle d'innovation Minatec	13/6/2001	Les Elus locaux et régionaux	64
67	Alliance stratégique entre le CSEM (Suisse) et le CEA-Léti (France)	13/6/2001	CSEM	65
68	Léti labs: a new way for the future	14/06/01	Annual Review	66
69	Pôle d'innovation Minatec - CEA -INPG	15/06/01	COMOS	67
70	Présentation du pôle d'innovation Minatec	18/06/01	Rotary Club	69
71	Bilan et perspectives financières du CEA-Léti	2/7/2001	Séminaire DRT	70
72	Présentation du pôle d'innovation Minatec	2/7/2001	Ville de Grenoble	71
73	Présentation du CEA et du Léti	5/7/2001	Medea+	72
74	Le Léti dans le pôle d'innovation Minatec	19/07/01	Direction Financière CEA	73
75	Présentation du pôle d'innovation Minatec	20/07/01	CCM	74
76	Minatec: relations avec le CNRS, les universités …	30/08/01	Administrateur Général CEA	75
77	Stratégie d'évolution du CEA-Léti (Bilan et perspectives financières)	30/08/01	Administrateur Général CEA	76
78	Recherche Technologique: les orientations du CEA-Léti	4/9/2001	Séminaire chefs de département	77
79	Assemblée générale du support	17/09/01	Assemblée Générale des Unités Support du CEA-Grenoble	78
80	"Task force" recrutements Léti 2001. Une collaboration fonctionnels-opérationnels réussie	18/09/01	Assemblée Générale des Unités Support du CEA-Grenoble	79
81	CEA-Léti et le pôle d'innovation Minatec	18/09/01	Visite du conseiller du Président Chirac	80
82	Grenoble: la réussite d'un modèle et un nouveau modèle pour l'avenir	20/09/01	BNP Paribas	81
83	Présentation du pôle d'innovation Minatec	21/09/01	Région Rhone-Alpes	82
84	Le CEA-Grenoble	26/09/01	Visite Muller et Vignolles	83
85	CEA-Léti et le pôle d'innovation Minatec	4/10/2001	Visite Motorola	84

	Titre de la présentation	Date	Destinataire(s)	Numéro de collecte
85	CEA-Léti et le pôle d'innovation Minatec	4/10/2001	Visite Motorola	84
86	Stratégie d'évolution du CEA-Léti (Bilan et perspectives financières)	5/10/2001	Assemblée Générale Léti	85
87	Rendez-vous majeurs 2001, Orientations du PMT 2002-2005	5/10/2001	Assemblée générale Leti	86
88	CEA-Grenoble	8/10/2001	Visite ENS Lyon	87
89	CEA-Léti et le pôle Minatec	16/10/2001	Roche Diagnostics	88
90	Le DTEN: contexte général	17/10/01	Metakides	89
91	Evolution du CEA-Léti dans le cadre de Minatec	22/10/01	Visite Administrateur Général Adjoint CEA + direction du tresor	90
92	Présentation générale du CEA-Léti	8/11/2001	IMEP	91
93	Colloque CED	16/11/01	Colloque CED	92
94	Strategie d'évolution du CEA Léti (bilan et perspectives financières)	20/11/01	COMET	93
95	Activités de R&D du CEA dans le domaine dans micro et nanotechnologies	22/11/01	Office parlementaire	94
96	Un CEA-Grenoble ouvert dans un pôle de dimension internationale	27/11/01	Comité Consultatif Régional	95
97	Stratégie d'evolution du CEA-Léti	30/11/01	Direction du Léti	96
98	Le CEA-Grenoble: organisation, stratégie et intégration régionale	5/12/2001	CNER	97
99	Le CEA, acteur national majeur dans le passage des microtechnologies aux nanotechnologies	12/12/2001	Presse	98
100	CEA-Léti vision going forward	19/12/01	Motorola	99
101	Minatec: Environnement scientifique et implication du CNRS	9/1/2002	Administrateur Général CEA	100
102	"Task force" produits liés DRT/Grenoble 2001. Une collaboration fonctionnels-opérationnels réussie	14/01/02	Séminaire DRT	101

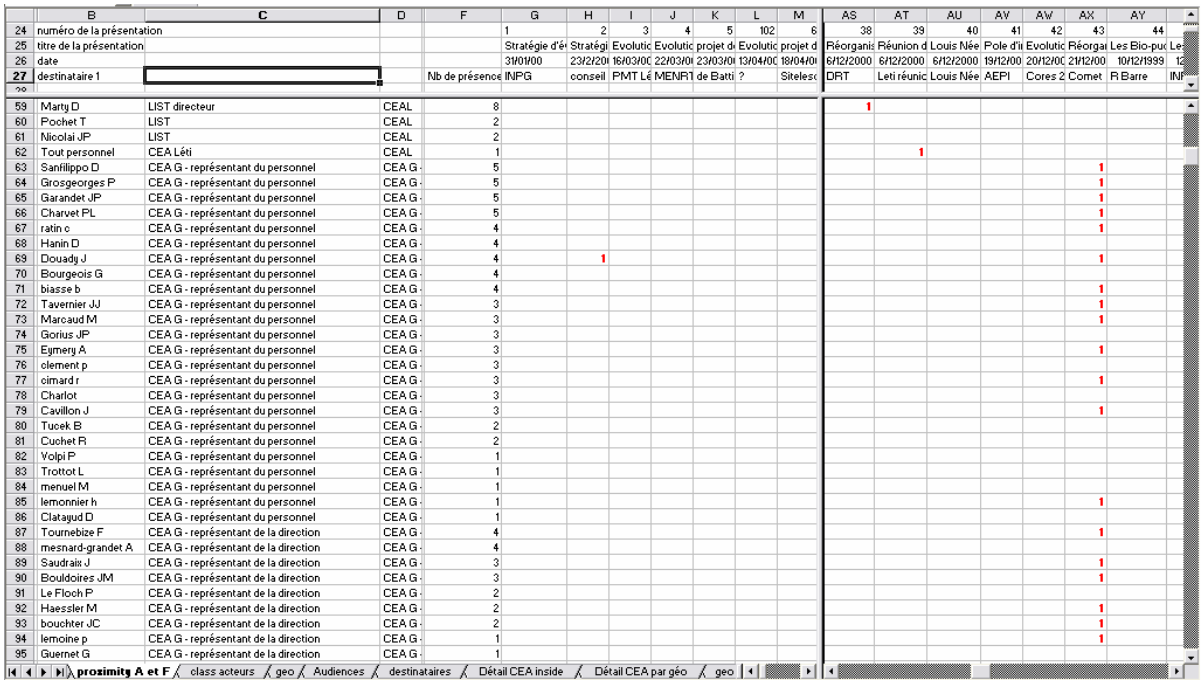
Annexe 2 - Format de la collecte des données

Impression d'écran 1 : Base de données de base des présentations



	B	C	D	E	F	G	
1	1	2		3		4	
2	Stratégie d'évolution du Léti	Stratégie d'évolution du Léti - projet de pole d'innovation en M et N		Evolution du Léti et projet de pole d'innovation en MNT		Evolution du Léti et projet de pole d'innovation e	
3	31/01/00	23/2/2000		16/03/00		22/03/00	
4	INPG	conseil d'adm du CEA		PMT Léti		MENRT / DIR Technology G Berger	
5							
12	36	34		57		39 + 15	
13	difficile car tout concourt à l'amener						
14	ransparents 1						
15	ransparents 2						
16	ransparents 3						
17	1. les axes de developpement du CEA-Grenoble	1. L'év des composants		1. L'év des composants		1. L'év des composants	
18	2. une approche globale de la R&D	2. Les 3 dimensions de la R&D en technologie		2. Les 3 dimensions de la R&D en technologie		2. Les 3 dimensions de la R&D en technologie	
19	3. l'observatoire des micro-nano technologies	3. Une approche globale de la R&D		3. Une approche globale de la R&D		3. Une approche globale de la R&D	
20	4. les trois dimensions de la R&D en technologie	4. La nécessaire ouverture du Léti		4. La nécessaire ouverture du Léti		4. La nécessaire ouverture du Léti	
21	5. l'évolution des composants	5. Le pole d'innovation en MNT		5. Le pole d'innovation en MNT		5. Le pole d'innovation en MNT	
22	6. la valorisation industrielle des travaux de R&D	6. Le cadre global d'év sur le bassin grenoblois		6. Le cadre global d'év sur le bassin grenoblois		6. L'aval industriel	
23	7. la nécessaire ouverture du Léti	7. L'aval industriel		7. L'aval industriel			
24	8. une stratégie d'opportunité locale			8. Les chiffres clés de la PF recherche			
25	"ce qui est simple est tjs faux, ce qui n'est pas simple est inutilisable"Paul Valéry			9. La situation spécifique du DEIN			
26	1. trois thématiques porteuses (MNT, BioT, NTprE) et de	"ce qui est simple est tjs faux, ce qui n'est pas simple	B25				
27	1. L'innovation: de l'idée à la réalité industrielle.chaîne de l'i	1. Les tendances lourdes des marchés des microte	B49	1. Les tendances lourdes des ma	inspiré de B49	1. Les tendances lourdes des ma	inspiré de B49/E
28	3. Pourquoi un observatoire? Une opportunité et une néc	1. Les 3 tendances de l'evolution des composants microelec .. Et la		1. MNT: la miniaturisation à tous	inspiré B33	1. MNT: la miniaturisation à tous	inspiré B33/E2
29	3. les bénéfices attendus	1. une evolution selon 2 voies complémentaires : gra	B45	1. Le microcomposant devient u	B46	1. Le microcomposant devient u	B46
30	3. capitaliser sur les 5 années d'expérience du Léti	1. L'approche globale des composants (ex des syste	B46	1. Une evolution des microcomp	B45	1. Une evolution des microcomp	B45
31	3. les étapes du processus de veille stratégique : graphiqu	1. La rencontre entre micro et nanotechnologies : gra	B47	1. Les nanoT ou la relève des mic	B47	1. La rencontre entre micro et nar	B47
32	3. nécessité d'un élargissement : de reseau d'experts, de li	1. La grande variété de produit - MNT: un domaine oc	B33	1. Une extension considérable du champ d'intervention du Léti		1. Une extension considérable du	E32
33	3. MNT: des thématiques ciblées : graphique (1) les techno	2. Les 3 dimensions de la R&D en technologie (sommaire titre) : int		2. synergies et complémentarité:	B37	5. Une ambition : constituer le lei	C45
34	3. un flux d'informations en entrée complet graphique : tec	2. synergies et complémentarités : les clés du futur d	B37	2.1. la cascade des besoins et la	B39	5. Le Leti: un laboratoire ouvert a	B52
35	3. un flux d'informations en sortie "multi-utilisateurs" grap	2. synergies et complémentarités : les clés du futur d	B38	exemple de complémentarité composant/système : le microfluxg		5. Une stratégie s'inscrivant dan	inspiré de B53
36	3. l'organisation de l'organisation de l'observatoire : graph	2. synergies et complémentarités : les clés du futur d	B37	2.2 l'offre globale technologique	B41	5. centre d'excellence au niv régi	E54
37	3. synergies et complémentarités : les clés du futur de la t	2.1la complementarité composants/systèmes - la c	B40	2.3 les PF technologiques ouve	B43	5. L'indispensable complementa	E66
38	3. synergies et complémentarités : les clés du futur de la t	2.2 l'offre globale technologique - des applications n	B41	2.3 les PF technologiques ouve	B44	5. Pole d'innovation: tête de res	E55
39	3. la cascade des besoins et la force du Léti : graphique er	2.3 les PF technologiques ouvertes - concentrer les	B42	3. L'innovation: de l'idée à la réali	B27	5. Le Pole d'innovation: ter "hub	E56
40	4.1la complementarité composants/systèmes - la cohére	2.3 les PF technologiques ouvertes - assurer la com	B43	3. les outils de la valorisation ind	B48	5. Ts les éléments du processus	E57
41	4.2 l'offre globale technologique - des applications nouve	2.3 les PF technologiques ouvertes - plusieurs PF c	B44	4. Le tarissement de la source d'	B50	5. Tous les éléments du process	C48
42	4.3 les PF technologiques ouvertes - concentrer les inves	3. L'innovation: de l'idée à la réalité industrielle.chaîn	B27	4. Le tarissement de la source d'	un peu B51	5. Une maitrise d'ouvrage partag	E59
43	4.3 les PF technologiques ouvertes - assurer la complém	4. Une "lame de fond" technologique pr préparer la ré	B50	4. Le tarissement de la source d'innovations technologiques - une		5. Pole d'innovation en MNT : vu	E61
44	4.3 les PF technologiques ouvertes - plusieurs PF compl	4. Le Léti à la croisée des chemins : coopération ave	B51	4. Le tarissement de la source d'innovations technologiques - pas		6. Un aval industriel en MT très p	C56
45	5.une evolution selon 2 voies complémentaires : graphiqu	5. Une ambition : constituer le 1er pole d'innovation européen en MI		4. Le tarissement de la source d'	B51	6. Un aval industriel en MT très p	E68
46	5. L'évolution vers le "system-on-chip" et l'offre globale L	5. Le Leti: un laboratoire ouvert aux coopérations av	B52	4. Le décrochage culturel du Léti - une stabilité des effectifs du Léti		6. Des partenariats étroits avec	C57

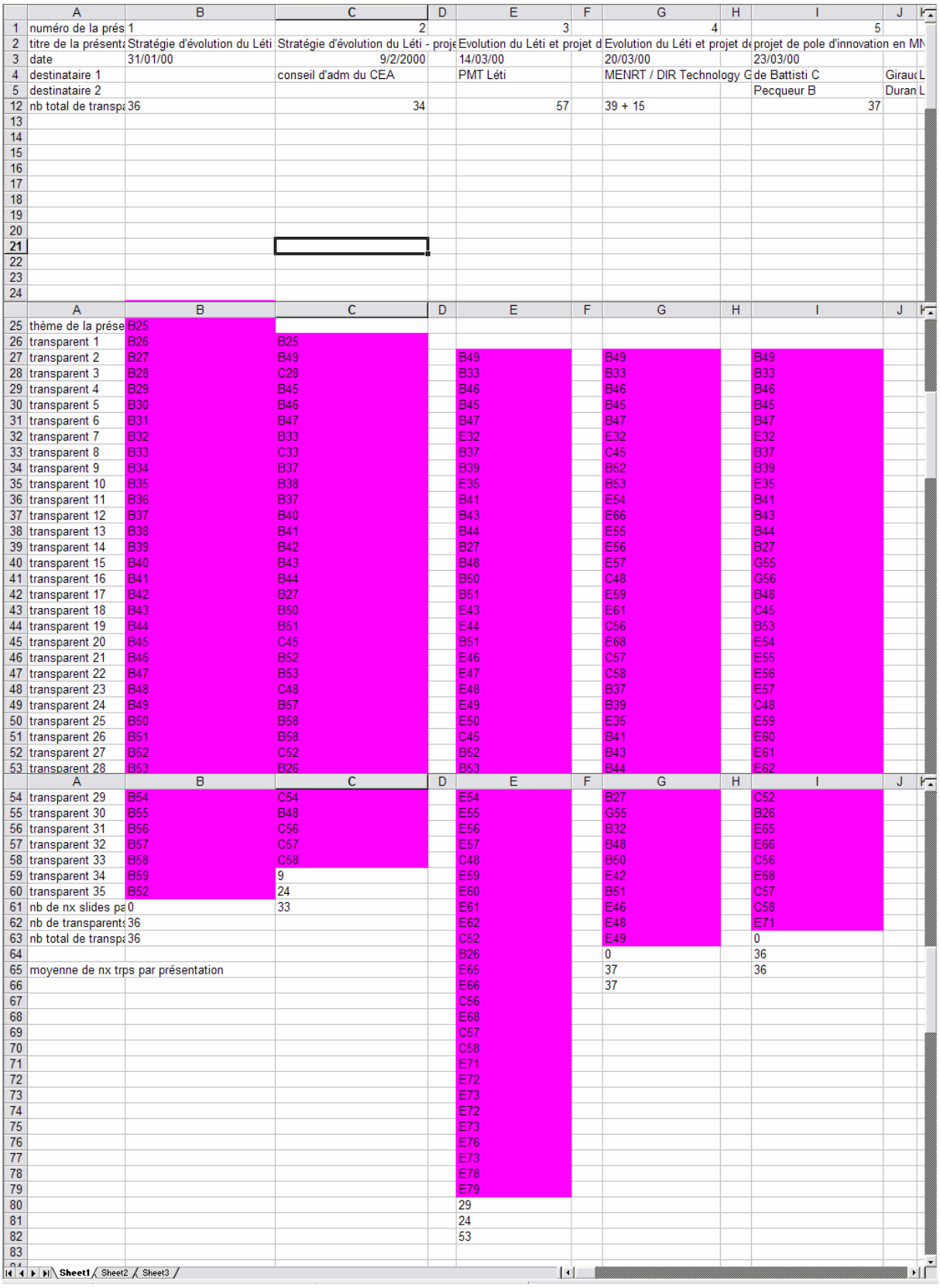
Impression d'écran 2 : base de données des participants aux présentations



	B	C	D	F	G	H	I	J	K	L	M	AS	AT	AU	AV	AW	AX	AY
24	numéro de la présentation				1	2	3	4	5	102	6	38	39	40	41	42	43	44
25	titre de la présentation				Stratégie d'é	Stratégi	Evolutic	Evolutic	projet d	Evolutic	projet d	Réorganis	Réunion d	Louis Née	Pole d'i	Evolutic	Réorgai	Les Bio-pu
26	date				31/01/00	23/2/200	16/03/00	22/03/0	23/03/0	13/04/00	18/04/0	6/12/2000	6/12/2000	6/12/2000	19/12/00	20/12/00	21/12/00	10/12/1999
27	destinataire 1			Nb de présence	INPG	conseil	PMT Lé	MENR1	de Batti	?	Sitelesc	DRT	Leti réunic	Louis Née	AEPI	Cores 2	Comet	R Barre
59	Marty D	LIST directeur	CEAL	8								1						
60	Pochet T	LIST	CEAL	2														
61	Nicolai JP	LIST	CEAL	2														
62	Tout personnel	CEA Léti	CEAL	1									1					
63	Sanfilippo D	CEA G - représentant du personnel	CEA G	5													1	
64	Grosgeorges P	CEA G - représentant du personnel	CEA G	5													1	
65	Garandet JP	CEA G - représentant du personnel	CEA G	5													1	
66	Charvet PL	CEA G - représentant du personnel	CEA G	5													1	
67	ratin c	CEA G - représentant du personnel	CEA G	4													1	
68	Hanin D	CEA G - représentant du personnel	CEA G	4														
69	Douady J	CEA G - représentant du personnel	CEA G	4		1											1	
70	Bourgeois G	CEA G - représentant du personnel	CEA G	4														
71	biasse b	CEA G - représentant du personnel	CEA G	4													1	
72	Tavernier JJ	CEA G - représentant du personnel	CEA G	3													1	
73	Marcaud M	CEA G - représentant du personnel	CEA G	3													1	
74	Gorius JP	CEA G - représentant du personnel	CEA G	3														
75	Eymery A	CEA G - représentant du personnel	CEA G	3													1	
76	olement p	CEA G - représentant du personnel	CEA G	3														
77	oimard r	CEA G - représentant du personnel	CEA G	3													1	
78	Charlot	CEA G - représentant du personnel	CEA G	3														
79	Cavillon J	CEA G - représentant du personnel	CEA G	3													1	
80	Tucek B	CEA G - représentant du personnel	CEA G	2														
81	Cuchet R	CEA G - représentant du personnel	CEA G	2														
82	Volpi P	CEA G - représentant du personnel	CEA G	1														
83	Trottot L	CEA G - représentant du personnel	CEA G	1														
84	menuel M	CEA G - représentant du personnel	CEA G	1														
85	lemonnier h	CEA G - représentant du personnel	CEA G	1													1	
86	Clatayud D	CEA G - représentant du personnel	CEA G	1														
87	Tournebize F	CEA G - représentant de la direction	CEA G	4													1	
88	mesnard-grandet A	CEA G - représentant de la direction	CEA G	4														
89	Saudrais J	CEA G - représentant de la direction	CEA G	3													1	
90	Bouldoires JM	CEA G - représentant de la direction	CEA G	3													1	
91	Le Floch P	CEA G - représentant de la direction	CEA G	2														
92	Haessler M	CEA G - représentant de la direction	CEA G	2													1	
93	bouchter JC	CEA G - représentant de la direction	CEA G	2													1	
94	lemoine p	CEA G - représentant de la direction	CEA G	1													1	
95	Guernet G	CEA G - représentant de la direction	CEA G	1														

La colonne B indique le nom de la personne présente
La colonne C indique fonction de la personne
La colonne D indique l'organisation d'appartenance de la personne
La colonne E fait le total du nombre de présence parmi les 102 présentations
Les colonnes suivantes indiquent la présence (1) ou non (-) de la personne pour chacune des présentations

Impression d'écran 3 : Base de données de suivi de l'utilisation des transparents



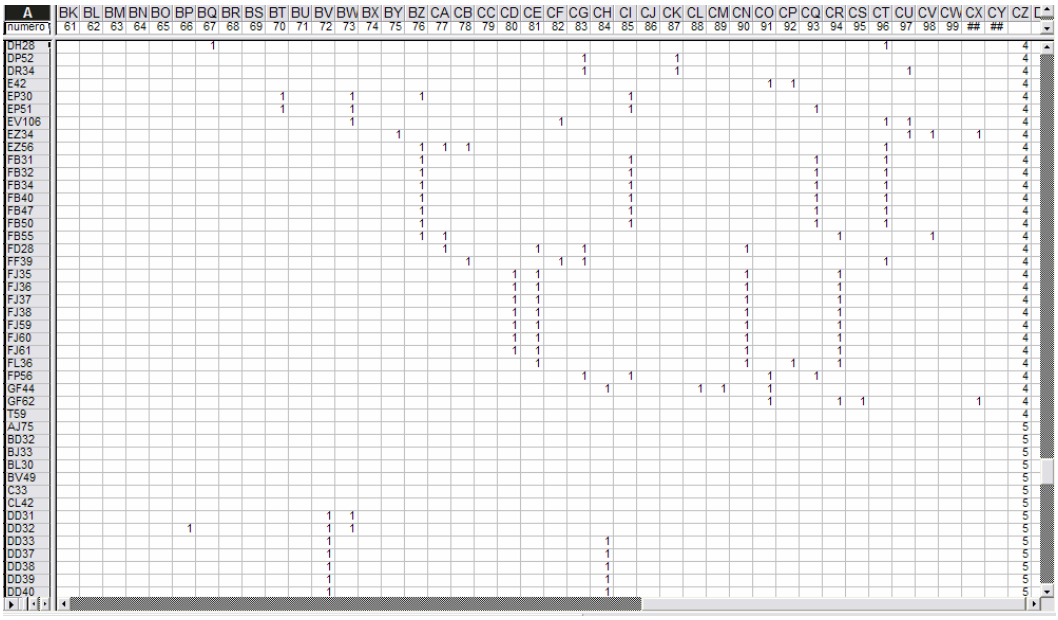
	A	B	C	D	E	F	G	H	I	J
1	numéro de la prés	1	2		3		4		5	
2	titre de la présent	Stratégie d'évolution du Léti	Stratégie d'évolution du Léti - proje		Evolution du Léti et projet d		Evolution du Léti et projet de		projet de pole d'innovation en MI	
3	date	31/01/00	9/2/2000		14/03/00		20/03/00		23/03/00	
4	destinataire 1		conseil d'adm du CEA		PMT Léti		MENRT / DIR Technology G		de Battisti C	Giraud L
5	destinataire 2								Pecqueur B	Duran L
12	nb total de transp	36	34		57		39 + 15		37	
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										

	A	B	C	D	E	F	G	H	I	J
25	thème de la prése	B25								
26	transparent 1	B26	B25							
27	transparent 2	B27	B49		B49		B49		B49	
28	transparent 3	B28	C28		B33		B33		B33	
29	transparent 4	B29	B45		B46		B46		B46	
30	transparent 5	B30	B46		B45		B45		B45	
31	transparent 6	B31	B47		B47		B47		B47	
32	transparent 7	B32	B33		E32		E32		E32	
33	transparent 8	B33	C33		B37		C45		B37	
34	transparent 9	B34	B37		B39		B52		B39	
35	transparent 10	B35	B38		E35		B53		E35	
36	transparent 11	B36	B37		B41		E54		B41	
37	transparent 12	B37	B40		B43		E66		B43	
38	transparent 13	B38	B41		B44		E55		B44	
39	transparent 14	B39	B42		B27		E56		B27	
40	transparent 15	B40	B43		B48		E57		G55	
41	transparent 16	B41	B44		B50		C48		G56	
42	transparent 17	B42	B27		B51		E59		B48	
43	transparent 18	B43	B50		E43		E61		C45	
44	transparent 19	B44	B51		E44		C56		B53	
45	transparent 20	B45	C45		B51		E68		E54	
46	transparent 21	B46	B52		E46		C57		E55	
47	transparent 22	B47	B53		E47		C58		E56	
48	transparent 23	B48	C48		E48		B37		E57	
49	transparent 24	B49	B57		E49		B39		C48	
50	transparent 25	B50	B58		E50		E35		E59	
51	transparent 26	B51	B58		C45		B41		E60	
52	transparent 27	B52	C52		B52		B43		E61	
53	transparent 28	B53	B26		B53		B44		E62	

	A	B	C	D	E	F	G	H	I	J
54	transparent 29	B54	C54		E54		B27		C52	
55	transparent 30	B55	B48		E55		G55		B26	
56	transparent 31	B56	C56		E56		B32		E65	
57	transparent 32	B57	C57		E57		B48		E66	
58	transparent 33	B58	C58		C48		B50		C56	
59	transparent 34	B59	9		E59		E42		E68	
60	transparent 35	B52	24		E60		B51		C57	
61	nb de nx slides pa	0	33		E61		E46		C58	
62	nb de transparent	36			E62		E48		E71	
63	nb total de transp	36			C52		E49		0	
64					B26		0		36	
65	moyenne de nx trps par présentation				E65		37		36	
66					E66		37			
67					C56					
68					E68					
69					C57					
70					C58					
71					E71					
72					E72					
73					E73					
74					E72					
75					E73					
76					E76					
77					E73					
78					E78					
79					E79					
80					29					
81					24					
82					53					
83										

Sheet1 Sheet2 Sheet3

Impression d'écran 4 : Extrait de la base de données des transparents par présentations



La première colonne reprend l'ensemble des transparents de base
La première ligne reprend les présentations par ordre chronologique (le présent extrait concerne les présentations 61 à 101).
Le chiffre « 1 » indique la présence du dit transparent dans la présentation concernée.
La dernière colonne effectue la somme des apparitions de chaque transparent.

Chapter 4 - Taking up the Challenge Initiated by New ICT in Collecting Data for Social Science Research: Twisting PowerPoint™ Format Presentations

1 Introduction

The quality of research depends on data that are available to scholars. Interviews can be used with an exploratory focus, to direct lines of inquiry but also with the aim to confirm elements found by other means. However, to study a case of institutional change, work can only be retrospective. Using interviews as central data sources therefore induces a risk of reconstruction, even involuntary, from the actors involved.
Archive search is a second method that can be considered. The quality of the archive set is fundamental. Two issues often arise: the access to data that can be limited for confidentiality reasons and, the complexity and multiplicity of the archive sets to explore. Moreover, due to the development of information and communication technologies (ICT), new problems may emerge. For example, paper notes and annotations that were precious elements to inform researchers on the conditions of a process unfolding might not be available anymore: indeed would emails sent from A to B to comment on such and such sentence in a contract would be kept and archived? How many of us keep such tracks in our mailbox? Historians are the first victims of these technological advances. Sociologists and researchers in management may be second and third on the list.

Moreover, technologies have changed working habits. Yates and Orlikowski (2005) examined the consequences that the use of "PowerPoint™ presentation genre" had on work and more precisely "how the use of this genre influences the communicative practices of organizational members and in particular how it enables and constrains their discursive choices and actions." (2005: 1). This comes as a fact interesting to note; but how can it pose troubles in process analysis and data collection? Hence, despite the fact that PowerPoint™ presentation format is widely used in business today, documents on which it is based. If Yates and Orlikowski present an inventory of fixtures in uses of the genre, it is still evolving and is becoming used as a document in itself as it comes to replace executive summaries. We, for example, have ourselves been subject to this trend as requirements for the presentation of results of a research project were to use a PowerPoint™ format and not a 250-page report. This may have been an isolated case; but as PowerPoint™ documents are being used more as strategic documents, this raises the concern of the ability to trace thoughts that underlie elements summarized in these PowerPoint™ documents. Despite this drawback, PowerPoint™ format possesses the advantage[106] that each word used ought to be carefully weighted and selected, as space is limited: sentences should be short, should present the idea clearly and be concise at the same time. It may therefore be a perfect subject for word analysis.

Due to advances in communication and information technologies, researchers therefore see traces to follow phenomena disappear and need thus to imagine original solutions to apprehend processes with what lie behind. This is the point of this article, to illustrate a particular method that has been developed to cope with these issues. The first section will introduce the selection of the case study while the following one shall present data

[106] This is only a hypothesis; it has not been investigated to our knowledge.

available and all information that can be extracted from it. In the third part, we combine all of them and expose the kind of analysis that can be directed and the hypothesis that they can lead to. We not try to validate them, as it would go beyond the scope of the present exercise. However, analysis shall be exposed in a companion article[107]. Conclusions follow.

2 Selection of the Case Under Investigation

We base the analysis on a case study that sees a tremendous change between state "A" (from the late 1990's) to state "B" (in 2005). The site is relatively well-known, located in a French region, the greater Grenoble area, specialized in microelectronics. The case shall not be exposed here in great details, as it is the object of chapter 1 in this PhD thesis. However, it can be characterized as follows: State "A" is depicted as a situation where actors are trapped in their technological trajectories, unable to renew their research programs and cope with international competition. State "B", on the contrary, gives a picture of a dynamic region organised around scientific and technological newly built platforms so as to reap fruits from promises at the nano-scale. The location became an attractive one witnessing the setting up of international companies.

The study focuses on the emergence phase of this space that is materialised by the signature of agreement of understanding between the funding parties on January 18th, 2002, called "Minatec act". Initial moves toward change have been reported back to the end of 1999, so the period under study covers a two-year era. The agreement ends the emergence phase as it laid the foundations for the future regional design. The agreement of understanding funded Minatec building. More than only a building, it institutionalised synergies between research, training and industrial valorisation as each of these have been assigned a particular aisle in the 4500m² new building. Bridges between the three have been set up, both physically speaking with the existence of passages and common spaces (coffee bars, canteen, transportation services etc) and cognitively speaking with the development of research spaces around technological platforms and research programs). This "model" has set the example and has been extended to the rest of region from 2002 on. The emergence phase is the most appealing one for researchers interested in entrepreneurial issues and for those motivated by agency matters. This stage is often one encompassing the most complexity and small quantity of data at the disposal of researcher is therefore the most problematic element.

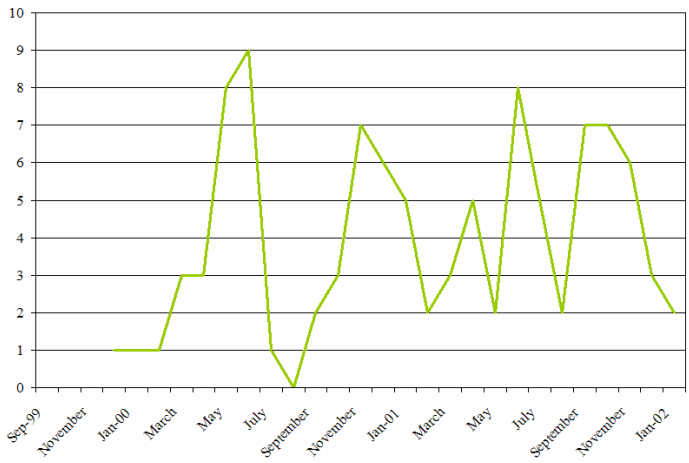
The case is challenging in the elements of proof that can be used to unveil the process from state "A" to "B". Two facts are problematical: the first one is that despite the number of actors involved in the process, only one possessed archives able to help in the understanding of the rationales for change. Hence, while the main[108] actors of the deal

[107] See Chapter 6 in the present PhD thesis
[108] Two ministries were also involved in a minor way (less than 8% of the overall budget)

were local and regional public authorities[109], two engineering schools from the INPG consortium[110] and a national public laboratory (CEA[111]), strategic archives able to retrace the emergence of the project were only located at Jean Therme's CEA Grenoble office. J.Therme was the head of CEA Grenoble in 2002. Other members of the coalition had in their possession only the project's technical elements: for example, documents in relation to legal elements were dispersed between all members, while description and configuration of the building was filed at the department level.

The second one is related to the use of new information and communication technology: only PowerPoint™ presentation format documents exist; strategic reports that we usually find in such situations do not exist. Jean Therme indeed preferred to use this media to report or inform on advances in the project. Over the emergence period, 102 presentations were organised (Figure 1).

Figure 1 Repartition of PowerPoint™ Presentations Over the Selected Period



For these reasons, the case is particularly well suited here, in the discussion of unveiling processes in situations with a lack of tracks.

[109] City, community of communes, county and regional levels

[110] INPG is a consortium of 9 engineering schools, mostly at the graduate level. ENSERG (specialised in electronics) and ENPG (specialised in physics) were the two schools joining the project. INPG along with CEA-Grenoble were the co-supporters of the Minatec project

[111] CEA is the National Nuclear Energy Center. It is situated in three different locations in France, one being the Grenoble site. Contrary to most national public research centers in France, CEA centers possess some strategic power and are allowed more autonomy. However, its general administrator has to agree to major investments and strategic decisions at the national level.

3 Data collection and extraction

This section is articulated around three points: PowerPoint™ presentations' content extracted, their contextual elements, and their structure. Each sub-section shall also present basic ways to exploit each aspect of the PowerPoint™ presentations, while the next section will bring all elements together in the format of hypotheses.

3.1 Exploiting Content Based on a Co-Word Analysis

As previously mentioned, PowerPoint™ presentations are the only strategic documents that exist. They present all elements to justify the project as well as its components and the steps for its realization. These presentations not only outline the project and inform on its progression, they also intend to test proposals, provoke reactions and discussions, and request agreement or support.

For that matter, each presentation is tailored. Slides are individually designed and arranged in complete presentations. Globally, the 102 presentations are composed of 3360 slides that were separately gathered and reproduced in a database. This collection was made possible as each presentation was archived which served as a repository for J.Therme in the design of new presentations. However, these 3360 slides are based on a set of 760 slides if we consider only bodies of slides without titles. The justification for such a statement is that titles are used to ease the flow of presentation. The 102 PowerPoint™ presentations are therefore re-arrangements of these 760 "basic slides"[112].

As discourse elements, the first obvious treatment is a textual one. As data collection was carried out by hand, basic rhetoric could already be proposed but as the quantity of information to take into account was very large, the assistance of software was required. This also insured a greater objectivity in data treatment. ICT tools can also be of help for researchers! Alceste™ co-word analysis software was selected. Co-word analysis has been judged as particularly relevant in this case due to the fact that the PowerPoint™ format induces a careful selection of words used. However, PowerPoint™ format is also widely used for combining words and visual effects including graphs. Scholars working on technics of education and communication have specially emphasized attention on this aspect (*e.g.* Bartsch and Cobern, 2003). Most often when a slide is composed of a graph, it is because it wants to highlight the connection between its diverse elements. This is why, when considering such a slide, the visual in itself could not be taken into consideration, but links that were made were kept: in this perspective, all words were considered as

[112] Conditions of production of these slides are also of interest in the study of a genesis of the discourse. This aspect however goes beyond the present work. It shall nevertheless be the object of Chapter 7 in this PhD thesis.
Aspects dealing with the structure of PowerPoint™ presentations will be presented in more details in the last sub-section of this section.

belonging to the same sentence or using Alceste's terminology, to the same UCE[113]. Lists of items also often characterize PowerPoint™ format slides. Again, to follow the author's purpose in designing this slide, UCEs were manually defined: if items were only accumulation of elements without direct links between each other, they were each considered as separate UCEs while they were considered belonging to the same UCE if they were indeed part of the same list. Figure 2 illustrates these various situations.

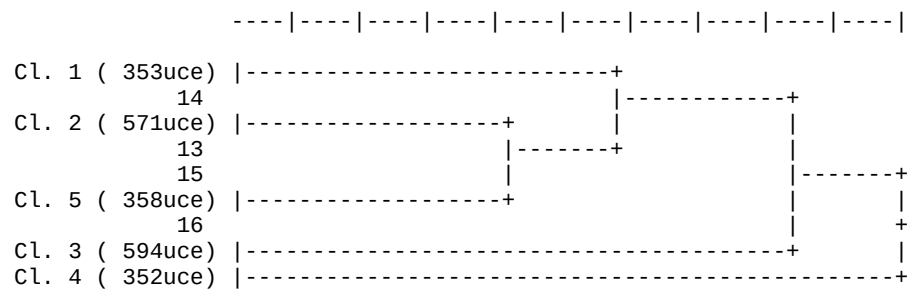
Figure 2 UCE's determination for different slides configurations

Having solved these technical problems and run the software on the data set – composed for memory of the 760 "basic slides" – its report presents statistical results. Only the main elements of interest are detailed here. The set is split in five "classes", each corresponding to a cluster of words that recurrently appear close to each other. This means that over the period under study five themes were discussed. We shall go back to this point in a moment.

[113] UCE is the basic unit of analysis. They are the equivalent to sentences while UCIs are the equivalent of paragraphs. Their definition is crucial to obtain a meaning analysis. Indeed, co-word search will occur first at the UCE level then at the UCI one. Each slide is considered presently as an UCI.
Alceste software can determine UCEs itself. It is usually a sentence determined by a punctuation mark such as dot, exclamation or interrogation mark.

The original dataset was split into 3631 UCE, which have been attributed to class. The method underlying the software is more easily understood if visualizing the attribution procedure (Figure 3): Alceste™ processes in steps; each one aims at separating the set under investigation in two sets depending on the closeness of words. The largest resulting set will itself be analysed separately and divided into two. The process is repeated until there is no more coherence in splitting a set.

Figure 3 Alceste's class attribution process illustrated by a dendogramme established based on a "hierarchic descending classification".



Words affected to a cluster are characterised by three variables[114]: (1) number of appearances of the word over the entire data set; (2) number of appearances of the word with other words associated to the cluster; (3) chi square (which can be interpreted here as follows: the higher the chi square (Chi²), the more central the word is to the cluster). Appendix 1 reproduces part of Alceste™ report. It is the responsibility of the analyst to assign a 'theme' to each cluster based on words affected to each. This is also the first opportunity for researchers to synthesise hypotheses. For example, in a cluster of words (Class 1) that regroups the main components of Minatec (see Appendix 1), the question arises as to why neither INPG, the co-leader of the project nor CNRS[115] appear in the list.

The software also assigns slides to classes based on words that belong to these slides, so that if a slide is composed of several words that all belong to the same class, the slide is

[114] Based on a two by two matrix, it should be possible to follow the type of vocabulary used along the emergence process. Vocabulary can be central or peripheral to a cluster depending on Chi² variable; and specific or generic depending on its relative presence in the cluster. But again, this analysis cannot be detailed here.

		Word 'X'Closeness or not to the class 'N' core	
		Word 'X' chi² > average of chi² of class N	Word 'X'chi² < average of chi² of class N
Relative presence of word 'X' in Class 'N'	> 80%	Central/specific	Peripheral/ specific
	< 80%	Central/generic	Peripheral / generic

[115] CNRS is the national research center. It funds research in all scientific fields. Laboratories are located all over France and their units are part of most university laboratories in what are called UMR (mixed research units). In Grenoble, it represented in 2002 27% of the human resources working in public labs in physics and mathematics, 12.5% of HR working in engineering, 7.6% of the workforce in ICT, 16% in chemistry, 7.3% in life sciences. All these scientific fields are encompassed in MiNaTec research themes.

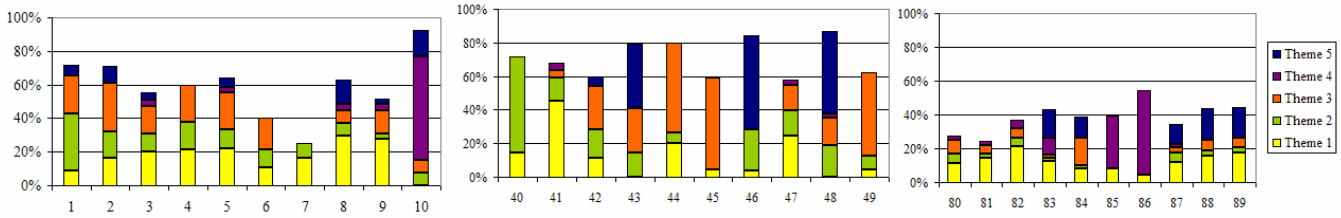
stated as also belonging to the same class. In very few cases, a slide can be affected to two classes. Chart 1 shows the proportion of slides assigned to each class.

Chart 1 Slides assigned to specific themes

	Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
Specific slide	66	66	66	65	65

Half of the slides are assigned to strictly one class. It is therefore possible to reconstruct presentations based on the classification of their thematic orientation. Figure 4 presents the relative thematic classification by presentation. It highlights the development of themes over time.

Figure 4 Evolution of themes at 3 different times of the mobilisaton process beginning (first 10 presentations), middle (presentations 40 to 49) and end (presentations 80 to 89)



These treatments are however only exploratory ones and call for more robust treatment such as factorial analysis. These are presented in Figures 5a and 5b and Figure 6[116]. They illustrate how presentations' thematic weight differs from one another. These explorations point to specific presentations and invite research for 'out of the norm' presentations: are they rupturing presentations? Whom were they designed for? Content should therefore be linked to contextual elements, which will be discussed in the second next sub-section.

Figure 5a Visual Representation of How Themes Are Associated in Presentations (Axes 1 and 2)

Globally, presentations that concentrate on Theme 1 do deal with Theme 5. Presentations that have a high proportion of Theme 3 slides usually also have a large proportion of Theme 2 slides but few Theme 4 slides.

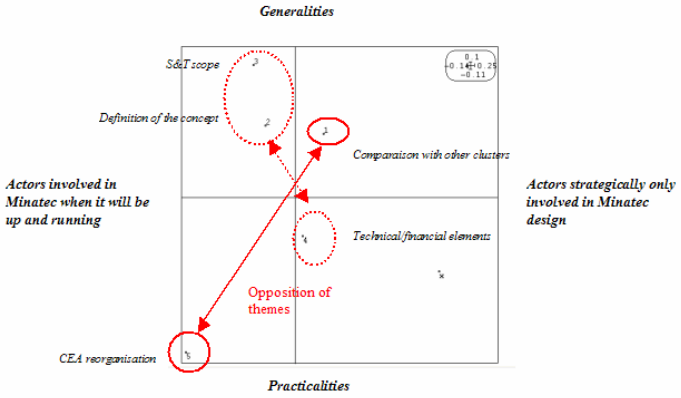


Figure 4a opposes the association of themes based on 2 axes:

- The vertical axis opposes the generalities of Minatec (Themes 1, 2 and 3) to the practicalities of realising Minatec (Themes 4, 5, x);

- The horizontal axis opposes those who will be involved in Minatec when it is up and running (Themes 2, 3, 5) to those who are only strategically involved in Minatec (Themes 1, 4, x).

[116] All three are exploited in Chapter 6

Figure 5b Visual Representation of How Themes Are Associated in Presentations (Axes 3 and 4)

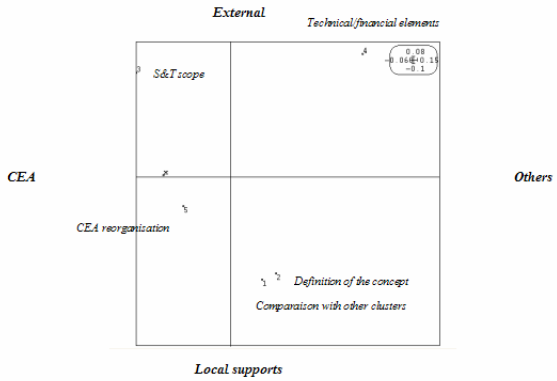
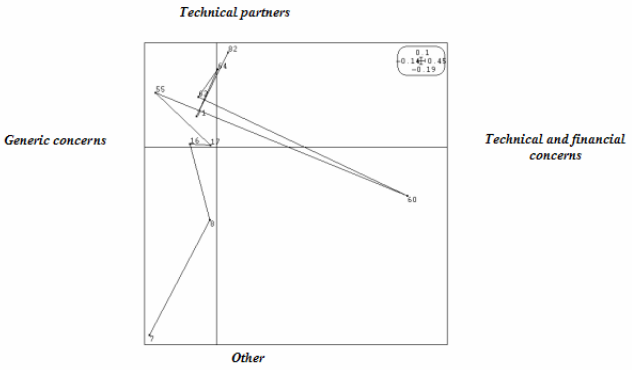


Figure 5b adds two elements to be considered which oppose the association of themes:
- The vertical axis opposes themes aimed at gaining specific support outside the core of the project leaders (S&T and financial elements – Themes 3 and 4) to themes aimed at gaining local support (Themes 1, 2 and 5). It is essentially a geographical segmentation;
- The horizontal axis opposes exclusively CEA-Grenoble (and its relation to its industrial and organisational partners (Themes 3 and 5) to others (Themes 1, 2 and 4).

Figure 6 Statistical Analysis Illustrating the Evolution of Themes Over Time for Presentations Designed to"Local Public Authorities" (Grenoble City – Grenoble Communities of Communes"Métro" – Isère Department – Rhône-Alpes Region)



Two axes explain the distribution of presentations (86% of the phenomenon):
- The horizontal axis opposes public authorities who are technical partners in the project to public authorities who are not directly involved in the technical making of the project but whose support is nevertheless required.
- The vertical axis basically opposes presentation 60 to the other ones. It is the only one dealing exclusively with "Theme 4" slides and it is also the presentation that has the largest presentation of "x" slides .

3.2 Finding Ways to Counterbalance the Limitations of PowerPoint™ Presentations

PowerPoint™ format presentation constitutes a rather 'formal' way to provide information on a project. This raises the following concern for the analysis: how can it be credible to study a complex phenomenon i.e. institutionalisation of a cluster with Minatec construction process being its emergence phase- only based on these 'organised' presentations? We should expect that the leader of the project also discusses it in more informal settings. Investigation of PowerPoint™ presentations alone could therefore not provide a reliable account of Minatec emergence process. J.Therme's agendas were brought in the data collection process to counter this objection. All meetings retrieved there were inserted into a database and his assistants provided details on aims of the

meetings and characteristics of the persons met[117]. Analysis of the agendas however confirms the fact that each person met, should it be on a one-to-one basis, was introduced to the project via a PowerPoint™ presentation format. They were therefore already included in the database. Agendas however provide an interesting element in the constitution of Minatec team and its progressive taking over of the project. Minatec team is the project team, selected by J.Therme, that dealt with the day-to-day administration of the project. However, J.Therme alone kept sole the project leads during the first half of the emergence phase, while the team was already constituted. It is only progressively and on a punctual basis that it took more weight, as the increase in the number of meetings in his diaries between the team and J.Therme illustrates.

The second limit that could be taken also deals with the complexity of the case under investigation. It is legitimate to say that such a transformation of the geography of innovation cannot bring support unanimously: other projects may have been launched by opponents and enrollees have probably not agreed directly about Minatec. This concern is related to controversies that Latour (1987) and Callon (1986) have been quite a lot debating. This objection cannot be completely wiped out but two elements come to limit it mostly. First, we collected all preliminary versions of Minatec agreement of understanding. These allow uncovering the "hard points" among Minatec main backers. Secondly, and it shall be an essential element of the analysis, each presentation is specifically designed based on its audience: PowerPoint™ presentations's content and slides re-arrangements were varying across time which may be interpretated as an evolution in Minatec emergence. Moreover, as stated earlier, PowerPoint™ presentations under study are no regular public presentations, they also discuss, propose, provoke, require agreement etc. Therefore, it is possible that suppression of slides or their disappearance for a certain period of time may be explained by the occurrences of specific events[118].

3.3 Exploiting Contextual Elements: Dates, Audiences and Location

PowerPoint™ presentations do not only account for thematic contents, they also provide contextual details including names of attendees, date, location and possibly agenda of the event surrounding J.Therme's presentation. These are pieces of information that shall allow us to categorise presentations and without which the analysis would leave many shadowy areas.

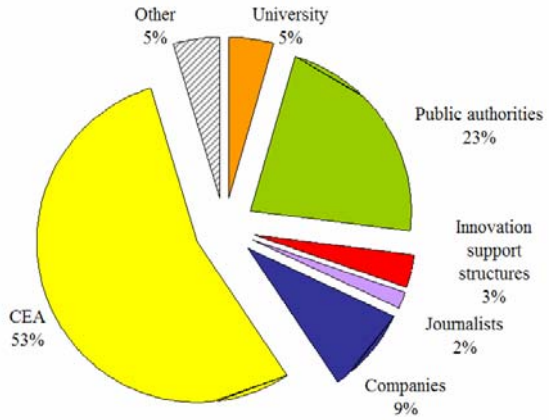
Data like location of the presentation and the agenda of the event in which the presentation occurs can be used; they do not provide in themselves central information but direct search, for example, of whom to address to recover lists of persons present at such

[117] Two months were totally blank in Therme's agenda. This period corresponded to Therme's promotion as CEA's general manager, which, based on his assistants, was light in activities in relation to Minatec (September-October 2000). This is also visible on Figure 1 that shows an important decrease in the number of PowerPoint™ presentations carried out.

[118] Here presented as an hypothesis. Related questions shall be the subject of Chapter 5 in this PhD thesis.

or such occasion. Names of attendees are indeed crucial. Such details were not included in the archives as such. However other hints (i.e. date and location of the presentation) allow reconstructing audiences one by one. Number of persons attending the presentations varies from 3 to several dozens[119]. It was then necessary to identify the position and organization of each of the 955 persons found. Chart 2 presents the distribution of attendees in broad categories[120].

Chart 2 Distribution of Attendees by Broad Categories (All Presentations)



Temporality is also central in investigating any process (see Figure 1). Without it, it would be useless to analyse content or audiences of the presentations. Only by linking all three is the analysis meaningfull. Immediate questions arise: is there an order in which audiences were approached? How is content linked to audience? Hypotheses can be formulated based on crossing audiences, time, and themes. They shall be presented in the third section of this paper but only as exploration lines as the purpose of this paper is to present original ways to extract the very substance of limited data sets.

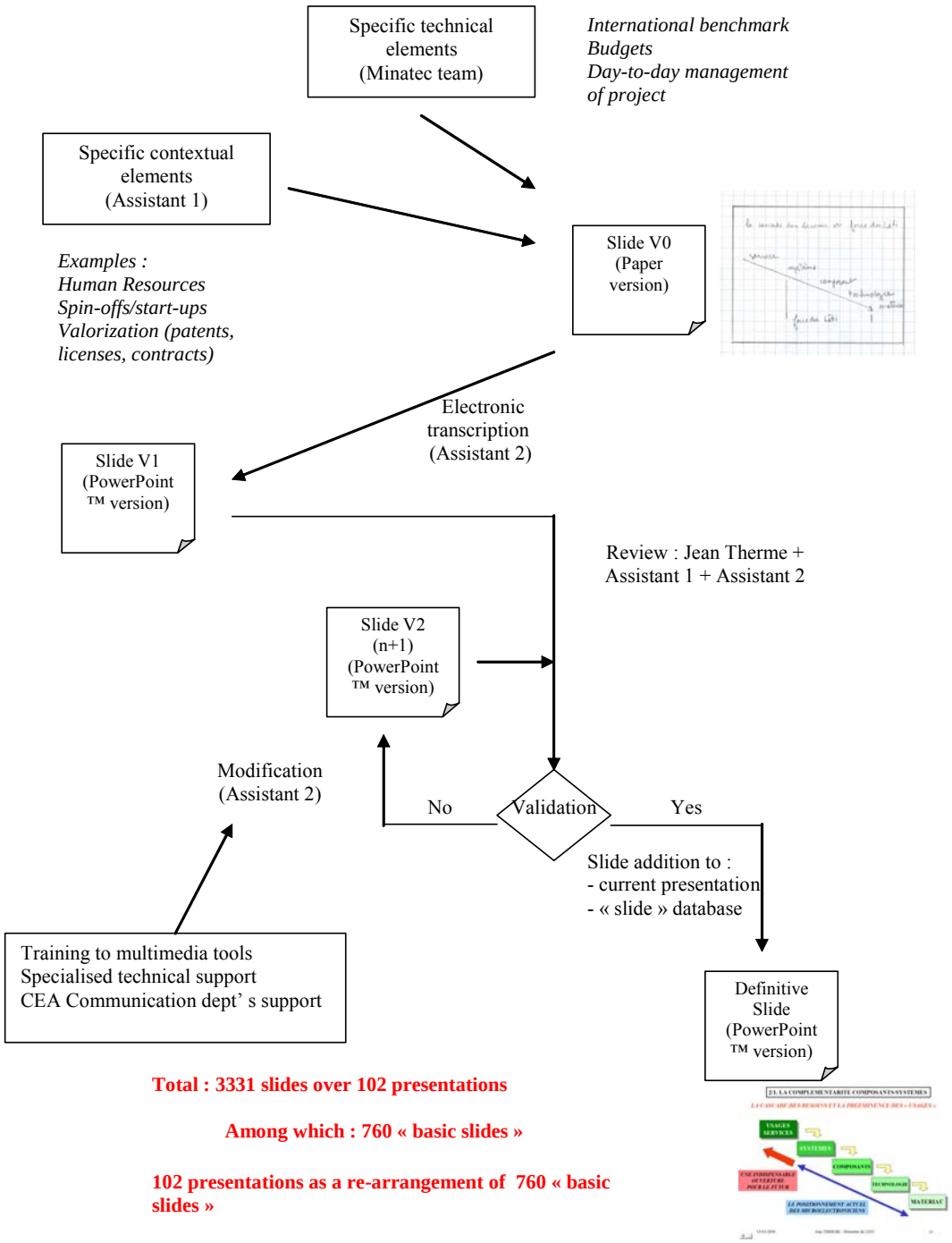
3.4 Exploiting PowerPoint™ Presentations Structure with "Slide Life"

Content and contexts are the obvious components of the analysis. However, a more original component of analysis lies in its structure. This aspect might not be transposed to all PowerPoint™ format presentations[121]; it is the very specific production process to which they were subject that authorizes such examination. Production of PowerPoint™ presentations results from a systematic, almost Taylorian way of working (Figure 7[122]).

[119] For two presentations, it was nevertheless impossible to identify audiences. For five other ones, it was not possible to identify persons by name – but as they belong to larger categories that could be identified (ex: CEA's new employees, Léti's personel, basic research partner laboratories), they are counted in the analysis. The analysis uses relative weight, which means that counting 100 engineers from CEA-Léti attending to a presentation counts for the same as 1 group of an unknown number of persons fromCEA-Léti. Both are counted as an audience coming 100% from CEA-Léti.
[120] Total exceeds 955 as some persons attending several presentations (attendance varies from 1 to 21).
[121] Powerpoint™ format presentation translates Therme's particulat way of working and not a general trend.
[122] Figure 7 is exploited in Chapter 7

This process has been observed on-site while archives were retrieved. Each slide is produced based on the same scheme before being added to the overall slide database. It is then mobilised upon request, customised with a title and incorporated into presentations.

Figure 7 The Slide Production Process



This work in slide production directs attention to an analysis based not only on presentation as a whole but as a re-arrangement of slides. The slide hence becomes the

unit of analysis. 3360 slides have been recovered during the collection phase; but if we consider only the body of each slide without the title[123], 760 "basic slides" should be counted. Appendix 2 presents a picture of data collection based on a "printscreen" photo: re-usage of slides is clearly visible there. Each slide is characterised by:

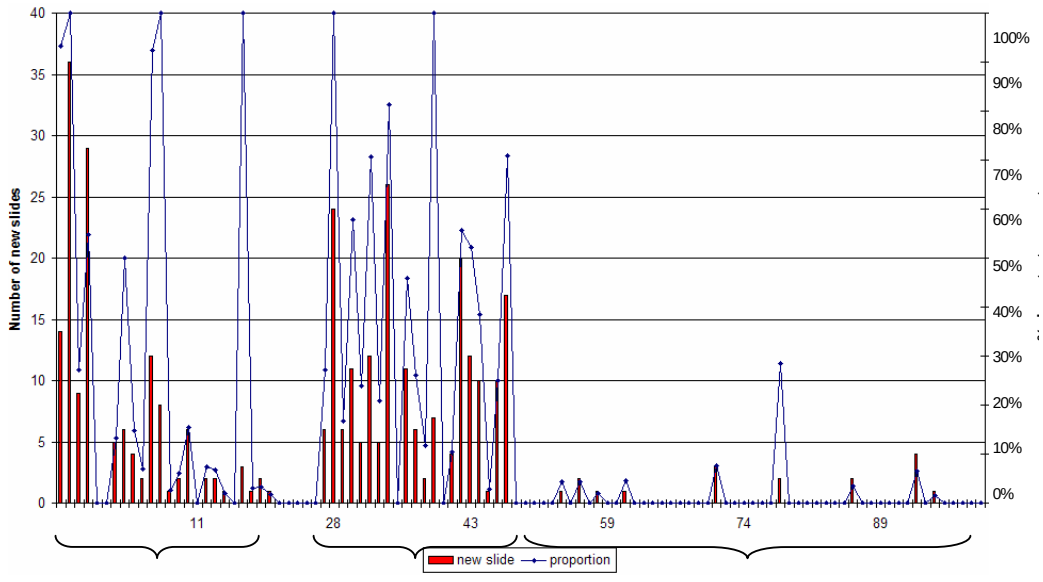
- Its first appearance (birth);
- Its temporal appearance(s) and disappearance(s) if any: some slides more disappear temporarily and then re-appear;
- Its last appearance within the 102 PowerPoint™ presentation set (death).

This statement invites a step-by-step follow-up of what is called "slide life". The name "slide life" has not been chosen unconsciously: it means that we suppose that slides are created for a purpose, which also implies that they die because they have fulfilled their task. This also explains why some may disappear: they may not fit in a specific presentation's overall purpose. It may well be that they present a point for which the audience is not ready to agree on; or only that a particular audience is not interested in or concerned by the subject presented by this slide[124]. Studying "slides life" therefore allows us to point to specific moments like controversies, cristallisation etc.

- Birth of Slide

A multiplicity of questions arises based on the potential analysis that can be carried out. Paying more attention to the appearance stage of slides is for example interesting. Figure 8 represents the percentage of new slides per presentation (presentations are classified in a time-basis).

Figure 8 Number of slide that appears at each presentation



[123] The underlying hypothesis is that titles are used to constitute a well-flowing presentation but that what really matters is the body of each slide, on which Therme spends time explaining and argumenting.

From this simple visual representation, we can deduce three stages in Minatec emergence process. This is possible if we hypothesise that appearance of new slides is linked to a development in content. Linking it with type of audience attending presentations that show a high rate of new slides permits us to deepen the diagnosis and points to specific presentations for the researcher to look at.

- Life of Slide

Most of the slides appear only once, which means that they have the kind of very short life of some butterflies that live only one day. Some others appear up to 56 times. Again, more suppositions are possible – for example: some slides are very audience specific, even specific to a single audience at a single moment. It does not mean that they are inevitably unimportant. On the contrary, they are crucial: for audiences that are not well acquainted with the area; they are used to insert the project into its context.

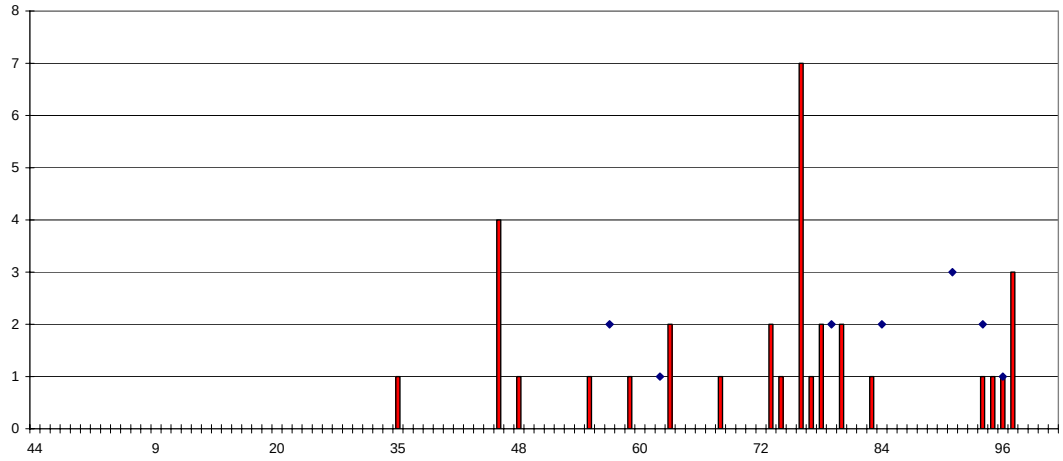
- After Death and Second Life of Slide

Death however may not be the end: there is a life after life, even for slides! Indeed, some slides fusion and hence create a new one (Figure 9[125]). This may be the symbol for a cristallisation, i.e. that a point has been acknowledged and is no more subject to discussion. This hypothesis is verified when considering the few immediate presentations that preceded the one in which slides merged: they are presentations in which decisions have been reached[126].

Some slides, on the contrary, expand and from a single slide become two. This may be interpretated in two ways: first, that a subject opens new discussion and needs to be re-examined in more details. Or it may mean that a specific audience is interested more particularly in a certain aspect and that it should be presented in more details. To decide which hypothesis is the right one requires individual analysis of the presentation in which such slides appear.

[124] Most often to state this point,we rely on a block of slides rather than on a single slide. Indeed, it is recurrent that a slide appears along with the same other slides.
[125] Figure 9 is exploited in Chapter 6
[126] Detailed analysis of audiences of these preceding presentations lead to this statement. Moreover, audiences of the presentations in which slides merged are not decision-making ones.

Figure 9 Fusion of slides (red crossbar) and expansion (blue dots) of slides over the period in each presentation



4 Potential analysis and hypotheses

Several questions and hypotheses have already been included, as ways to extract meaning from data were detailed. However, they were only exploratory ones based on single elements. What is proposed now is to bring them in networks of hypotheses. we here only focus on the main elements of the process to unveil its general trend and check whether the process is close to ones that have been accounted for in other respects. Let me remind the reader here that the aim of this paper, is not to validate hypotheses but to show researchers, facing challenges due to new ITC practices that they can nevertheless find ways around.

Let us first recapitulate the individual facts that were presented above:

- It is possible to determine where decisions are taken in the process based on the appearance of new slides, mergers of slides and proportion of slides in a presentation that appears only once.
- It is possible to determine broad periods in the process as well as who the actors who matter are, based on audience analysis, appearance of new slides and theme analysis across time and audiences.

Three large periods (with some overlapping) are determined based on those (see Chapter 6 for details):

1. Presentation to the main backers and feasibility studies
   - Turning point: pre-acceptance of CEA-headquarters based on feasibility studies
   - Minatec team appointed in December 2000
2. Increase in breadth of the mobilisation effort

- Turning point: vote by financial backers (July 2001) and CEA headquarters (September 2001)

3. Practical details are dealt with while industrial partners are consulted.
   - Turning point: signature of "Minatec agreement of understanding" (Januray 2002)

This seems a typical sequence. However some aspects are calling for attention to direct research along the following line: the project is constructed for and from the outside. This is translated also by saying that (1) the most involved in the project when it will be up and running (industries and scientists) are not part of the decision process and (2) external support at all levels is looked for. Hints include:

- **Scientific and technological content is not detailed**: industries are only informed of decisions taken at a different level despite the fact that a third of Minatec total space will be allocated to them. Moreover, words associated to science and technology (in Alceste® clusters) only propose current technology vocabularies: to "sell" the project, J.Therme sells current technologies, not future ones.
- Despite the large internal impact (full reorganisation of all CEA-Grenoble; not only its electronics laboratories) that the project will induce, **CEA-Grenoble staff is not consulted** early in the project. It is only later in the project that the need for reorganization is introduced.
- **External supports**, even symbolic ones[127], **are searched for in the early phase** (phase 1) of the project. J.Therme presented the project to two European commissioners, the French parliament and a science minister: they are consulted because they represent "celebrities" acting as sponsors of the project. Financial backers, local and regional authorities, are the first to be involved in the project: however, they only collaborate in funding the buildings, not at all in Minatec as a science and technology centre.

This supposition is only based on the analysis of PowerPoint™ presentations. The point here was not to verify the conformity in a scientific manner but rather to expose the kind of work that can be undertaken based on what seem like flawed research methods. Note however, that interviews and on-site observation come to confirm it.

[127] They will not finance the project

5 Conclusion

Researchers in social science are faced with many flaws in the process of data collection. Books on methods like Yin (2003) provide useful guidelines to avoid major mistakes in methods. However, as ICT have invaded organizations, researchers encounter new challenges to gather data able to support the reconstruction of events: data may be more sporadically dispersed or incomplete. Nevertheless standards to conduct quality research stay alike and researchers may therefore be obliged to be more creative and to develop new research methods. We have here used a specific case to present one of them. The study is based on the analysis of the emergence phase of what can be classified as cluster revival. The promotion is based only on public presentations; no other strategic documents can come to support it. Considering the complexity of the process and the multiplicity of actors involved directly or indirectly in the project, it may seem utopic to use this material as principal data. However, by "twisting" PowerPoint™ presentations to the researcher's advantage and using complementary data (here agenda and versions of the agreement of understanding) and interviews to confirm findings, it is possible to build a plausible method.

The major limitation to acknowledge is that the few clues that are left behind have an important impact on what aspect of the phenomenon might be looked up and which theoretical supports may be called upon to explain it. Researchers who are not supporting grounded theory developments may not in this case find any satisfaction in the present account.

Appendix 1 – Alceste® analysis report (extract: beginning and Classe 1)

```
* Logiciel ALCESTE (4.7 - 01/12/02) *
 ------------------------------------

 Plan de l'analyse :numtPhL.pl ; Date :  4/ 8/**; Heure : 17:51:21

 C:\Program Files\ADT-Image\&&_0\
 numttrpcorriées apresPhL.txt
 ET 1 1 1 1
 A  1 1 1
 B  1 1 1
 C  1 1 1
 D  1 1 1 0 0
 A1   1   3   0
 A2   3   0
 A3   1   1   0
 B1   0   4   0   1   9   0   1   1   0
 B2   2   2   0   0   0   0   0   0
 B3  10   4   1   1   0   0   0   0   0   0
 C1   0   121
 C2   0   2
 C3   0   0   1   1   1   2
 D1   0   2   2
 D2   0
 D3   5   a   2
 D4   1  -2   1
 D5   1   0

 ----------------------
 A1: Lecture du corpus
 ----------------------

 A12 : Traitement des fins de ligne du corpus :
 N° marque de la fin de ligne :

 Nombre de lignes étoilées :        760

[…]

Classification Descendante Hiérarchique...
 Dendrogramme des classes stables (à partir de B3_rcdh2) :


                ----|----|----|----|----|----|----|----|----|----|

 Cl. 1 ( 353uce) |--------------------------+
            13                             |--------+
 Cl. 2 ( 571uce) |----------------------+    |        |
            12                        |----+        |
            14                        |             |-----------+
 Cl. 5 ( 358uce) |----------------------+             |           |
            15                                       |           |+
 Cl. 3 ( 594uce) |------------------------------------+           |
 Cl. 4 ( 352uce) |--------------------------------------------------+

 ----------------------
 C2: profil des classes
 ----------------------

 Chi2 minimum pour la sélection d'un mot     :        3.31

 Nombre de mots (formes réduites)            :       1070
 Nombre de mots analysés                     :        899
 Nombre de mots "hors-corpus"                :        760
 Nombre de classes                           :          5

        2228 u.c.e. classées soit      61.360510%

 Nombre de "1" analysés                         :       8182
 Nombre de "1" suppl. ("r")                     :       2307
```

Distribution des u.c.e. par classe...

 1eme classe :   353. u.c.e. 1242. "1" analysés ; 285. "1" suppl..
 2eme classe :   571. u.c.e. 2243. "1" analysés ; 664. "1" suppl..
 3eme classe :   594. u.c.e. 1830. "1" analysés ; 494. "1" suppl..
 4eme classe :   352. u.c.e. 1406. "1" analysés ; 438. "1" suppl..
 5eme classe :   358. u.c.e. 1461. "1" analysés ; 426. "1" suppl..

Classe n° 1 => Contexte A

Nombre d'u.c.e.   :   353. soit : 15.84 %
Nombre de "uns" (a+r)   :   1527. soit : 14.56 %
Nombre de mots analysés par uce :   3.52

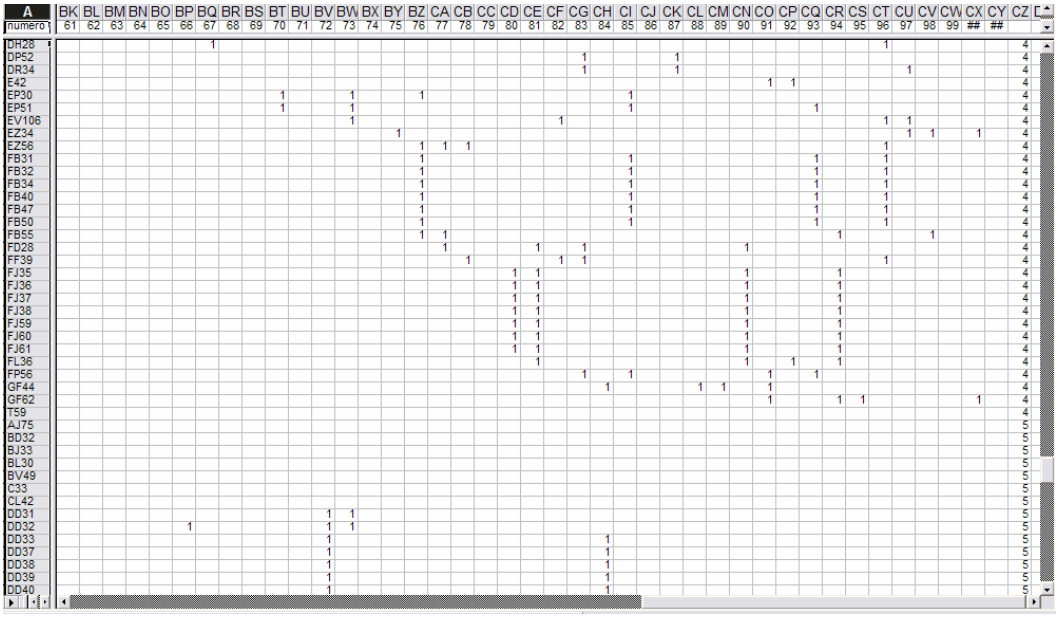
num	effectifs		pourc.	chi2	identification
16	2.	3.	66.67	5.82	A cooperati+f
24	19.	27.	70.37	60.94	A europeen+
35	3.	5.	60.00	7.33	A francais+
38	15.	45.	33.33	10.54	A grand+
48	7.	13.	53.85	14.16	A internationa+l
57	12.	23.	52.17	23.00	A mondia+l
59	17.	33.	51.52	31.97	A nationa+l
74	7.	20.	35.00	5.55	A premier+
89	3.	3.	100.00	15.96	A structura+l
109	6.	10.	60.00	14.69	G europe
111	5.	5.	100.00	26.62	G paris
112	13.	19.	68.42	39.73	G rhone
113	8.	8.	100.00	42.65	G toulouse
118	3.	4.	75.00	10.52	N agence+
121	7.	8.	87.50	30.92	N alliance+
122	5.	11.	45.45	7.27	N amont
129	3.	4.	75.00	10.52	N atout+
143	3.	3.	100.00	15.96	N brique+
146	5.	12.	41.67	6.03	N cadre+
160	4.	10.	40.00	4.40	N coeur+
163	3.	6.	50.00	5.26	N comparaison+
167	3.	4.	75.00	10.52	N conferenc+e
171	3.	4.	75.00	10.52	N cours
211	2.	3.	66.67	5.82	N espace+
248	21.	42.	50.00	37.45	N laboratoire+
280	22.	48.	45.83	33.09	N niveau+
298	4.	4.	100.00	21.28	N photo+
322	4.	6.	66.67	11.65	N promotion+
337	10.	16.	62.50	26.31	N region+
341	11.	24.	45.83	16.36	N reseau+
352	3.	3.	100.00	15.96	N seminaire+
363	3.	7.	42.86	3.84	N succes
364	5.	5.	100.00	26.62	N sud+
374	2.	4.	50.00	3.51	N tour+
391	2.	4.	50.00	3.51	N zone+
397	2.	3.	66.67	5.82	V aller.
415	4.	7.	57.14	8.98	V constitu+er
447	2.	4.	50.00	3.51	V inscrire.
460	3.	4.	75.00	10.52	V particip+er
509	6.	16.	37.50	5.67	Y base+
578	7.	9.	77.78	26.00	Y numer+16
602	5.	15.	33.33	3.46	Y responsa<
629	17.	25.	68.00	51.58	alpes
632	4.	4.	100.00	21.28	applied
642	7.	7.	100.00	37.30	bernin
645	5.	5.	100.00	26.62	biomerieux
657	2.	3.	66.67	5.82	cadre_structurel
660	3.	4.	75.00	10.52	castelletto
663	28.	43.	65.12	79.84	cea_leti
670	6.	12.	50.00	10.56	cmos
671	3.	4.	75.00	10.52	cnet
672	6.	12.	50.00	10.56	cnrs
673	10.	13.	76.92	36.59	cnrt
684	14.	22.	63.64	38.06	crolles
685	13.	15.	86.67	56.81	crolles_2
686	22.	23.	95.65	111.02	csem
710	5.	5.	100.00	26.62	equipementiers
712	7.	11.	63.64	18.94	euraccess
713	4.	4.	100.00	21.28	eurimus
716	3.	3.	100.00	15.96	faure

726		37.	65.	56.92	84.74		grenoble
727		8.	11.	72.73	26.83		grenoblois+
734		11.	11.	100.00	58.72		iemn
739		27.	28.	96.43	138.11		imec
740		2.	4.	50.00	3.51		implication+
749		4.	6.	66.67	11.65		inside
752		2.	4.	50.00	3.51		intel
757		11.	13.	84.62	46.38		laas
759		4.	5.	80.00	15.47		lab+
760		4.	5.	80.00	15.47		leader+
761		39.	128.	30.47	21.78		leti
762		5.	5.	100.00	26.62		lille
763		5.	13.	38.46	5.02		logiciel+
765		3.	3.	100.00	15.96		lyon
769		2.	4.	50.00	3.51		marketing
777		9.	22.	40.91	10.47		micro_
778		38.	63.	60.32	96.17		Minatec
783		3.	3.	100.00	15.96		motorola
786		5.	9.	55.56	10.69		nano
792		5.	6.	83.33	20.55		nanosciences
793		14.	39.	35.90	11.97		nanotechnologie+
795		5.	5.	100.00	26.62		nexus
800		8.	14.	57.14	18.02		objets_communicants
812		6.	6.	100.00	31.96		philips
819		3.	5.	60.00	7.33		plateformes_technol
827		8.	28.	28.57	3.45		pole_d
828		13.	19.	68.42	39.73		pole_Minatec
829		6.	7.	85.71	25.71		polygone
836		2.	4.	50.00	3.51		proteom+
850		2.	4.	50.00	3.51		reseaux_nationaux
851		13.	13.	100.00	69.46		rmnt
852		8.	10.	80.00	31.01		rousset
865		5.	8.	62.50	13.11		soitec
870		22.	33.	66.67	64.89		stm
895		3.	5.	60.00	7.33		vs
905	*	2.	4.	50.00	3.51	*	s
908	*	22.	91.	24.18	4.94	*	0 avec
920	*	3.	4.	75.00	10.52	*	2 point
973	*	42.	209.	20.10	3.13	*	8 en
988	*	3.	6.	50.00	5.26	*	J deux
989	*	4.	10.	40.00	4.40	*	J million+
995	*	2.	3.	66.67	5.82	*	M AEPI
1016	*	5.	5.	100.00	26.62	*	M FT_R&D_R&D
1024	*	7.	7.	100.00	37.30	*	M IEF
1026	*	3.	3.	100.00	15.96	*	M IMEP
1035	*	3.	3.	100.00	15.96	*	M LPM
1036	*	3.	3.	100.00	15.96	*	M LTM
1037	*	3.	8.	37.50	2.82	*	M M
1038	*	3.	6.	50.00	5.26	*	M MEMS
1041	*	2.	4.	50.00	3.51	*	M MPO
1043	*	5.	6.	83.33	20.55	*	M NMRC
1062	*	2.	3.	66.67	5.82	*	M SPM
1130	*	3.	3.	100.00	15.96	*	*numt_B59
1131	*	4.	4.	100.00	21.28	*	*numt_BB27
1137	*	3.	4.	75.00	10.52	*	*numt_BD36
1138	*	3.	3.	100.00	15.96	*	*numt_BD43
1165	*	3.	3.	100.00	15.96	*	*numt_BH56
1184	*	5.	5.	100.00	26.62	*	*numt_BR28
1185	*	24.	24.	100.00	128.87	*	*numt_BR29
1186	*	4.	4.	100.00	21.28	*	*numt_BR30
1189	*	6.	6.	100.00	31.96	*	*numt_BR34
1195	*	4.	4.	100.00	21.28	*	*numt_BT28
1211	*	2.	4.	50.00	3.51	*	*numt_BV41
1237	*	5.	5.	100.00	26.62	*	*numt_BZ43
1244	*	3.	3.	100.00	15.96	*	*numt_C54
1245	*	5.	5.	100.00	26.62	*	*numt_C56
1291	*	5.	5.	100.00	26.62	*	*numt_CN38
1294	*	2.	4.	50.00	3.51	*	*numt_CN41
1349	*	4.	4.	100.00	21.28	*	*numt_DB27
1387	*	2.	3.	66.67	5.82	*	*numt_DF35
1403	*	7.	7.	100.00	37.30	*	*numt_DH32
1408	*	7.	7.	100.00	37.30	*	*numt_DH37
1415	*	5.	5.	100.00	26.62	*	*numt_DJ30
1445	*	3.	3.	100.00	15.96	*	*numt_DP62
1446	*	4.	4.	100.00	21.28	*	*numt_DP63
1486	*	5.	5.	100.00	26.62	*	*numt_DT51
1487	*	7.	8.	87.50	30.92	*	*numt_DT54
1506	*	7.	7.	100.00	37.30	*	*numt_DZ36

```
1508 *   3.   9.    33.33    2.07 *      *numt_DZ46
1517 *   7.   7.  100.00   37.30 *      *numt_E48
1521 *   8.   8.  100.00   42.65 *      *numt_E55
1530 *   3.   3.  100.00   15.96 *      *numt_E68
1608 *   4.   9.   44.44    5.54 *      *numt_EX58
1614 *   3.   3.  100.00   15.96 *      *numt_EZ29
1625 *   3.   3.  100.00   15.96 *      *numt_FB37
1633 *   4.   4.  100.00   21.28 *      *numt_FB51
1635 *   3.   3.  100.00   15.96 *      *numt_FB53
1636 *   5.   5.  100.00   26.62 *      *numt_FB54
1637 *   4.  11.   36.36    3.49 *      *numt_FB55
1638 *   3.   3.  100.00   15.96 *      *numt_FB57
1639 *   9.   9.  100.00   48.00 *      *numt_FB58
1686 *   6.   6.  100.00   31.96 *      *numt_FN52
1700 *   4.   4.  100.00   21.28 *      *numt_FR42
1731 *   6.   6.  100.00   31.96 *      *numt_GF58
1732 *   6.   6.  100.00   31.96 *      *numt_GF60
1733 *   4.   4.  100.00   21.28 *      *numt_GF62
1739 *   7.   7.  100.00   37.30 *      *numt_GL40
1743 *   3.   5.   60.00    7.33 *      *numt_GL73
1744 *   4.   4.  100.00   21.28 *      *numt_GN30
1747 *   4.   4.  100.00   21.28 *      *numt_GN42
1752 *  11.  11.  100.00   58.72 *      *numt_GN49
1753 *  10.  10.  100.00   53.36 *      *numt_GN50
1755 *   3.   3.  100.00   15.96 *      *numt_GN52
1756 *   6.   6.  100.00   31.96 *      *numt_GN53
1757 *   8.   8.  100.00   42.65 *      *numt_GN54
1767 *   3.   3.  100.00   15.96 *      *numt_GP59
1768 *   3.   3.  100.00   15.96 *      *numt_GP61
1779 *   5.   5.  100.00   26.62 *      *numt_GT36
1786 *   3.   6.   50.00    5.26 *      *numt_GV39
1788 *   6.   8.   75.00   21.07 *      *numt_GX27
1816 *   4.  10.   40.00    4.40 *      *numt_N41
1820 *   3.   5.   60.00    7.33 *      *numt_Q32
1821 *   3.   4.   75.00   10.52 *      *numt_R64

Nombre de mots sélectionnés   :  173
```

Appendix 2: Extract from the Slide Database



The first column details the name of each slide
The first row shows each presentation ordered chronologically (here presentations 61 to 101)
« 1 » indicates that the slide x belongs to presentation y
The last row counts the number of appearance per slide.

Partie 3 – Les Pratiques en question

Chapter 5 – Discourse in the Making: Using Tests to Make the Transition from Fiction to Reality

1 Introduction

The concept of legitimacy is central to institutional theory (Suchman, 1995; Meyer and Rowan, 1977) to the extent that institutions that are losing their legitimacy are in the process of being deinstitutionalised (Oliver, 1992). Legitimacy is therefore essential to maintaining institutions. At the other end of the spectrum, institutions in the making suffer from a 'liability of newness' (Zimmerman and Zeitz, 2002: 414, Lawrence et al., 2002) and are threatened by their lack of legitimacy (Aldrich and Fiol, 1994; Zimmerman and Zeitz, 2002).

Strategies of legitimacy gaining are, de facto, encompassed in institutional work, and are defined as the set of practices through which actors create, maintain and disrupt institutions (Lawrence and Suddaby, 2006). Institutional work can be analysed using a wide range of methods among which we find discourse analysis, which is particularly relevant in light of this statement: "Discourse is the principal means by which organization members create a coherent social reality that frame their sense of who they are" (Mumby and Clair, 1997: 181). If this statement is true for organizations, it can also be applied to all levels of organizational analysis (Grant and Keenoy, 2001), including institutions, and is reinforced when stating that discourses allow certain behaviour to happen (Deetz and Mumby, 1990) and "some discourses and meanings may become so privileged and taken for granted that they are reified" (Hardy, 2001:28).

Most accounts of discourse analysis focus on its final effect, i.e. illustrating how it supports institutional change. Studies most often consider discourse as a whole when it is linked to the change that occurred. In these cases, the discourse that is presented is formatted and re-organises events that have happened; but what is hidden is that the discourse is actually made of different pieces that are assembled over time. This is to say that much less attention has been paid to understanding the process of discourse making. However, this step is essential to uncovering the weak link that exists between legitimacy and discourse. In that matter, following the day-to-day work of discourse creation is illuminating.

In this paper, we seek to respond to Phillips et al. (2004) who made a first theoretical attempt[128] to unveil the process of institutionalisation by linking texts, actions and institutions, and who made a call for more empirical work to be done. To study the institutional effects of discourse in the making, we conducted a qualitative study of the construction process of the Grenoble innovation centre in micro- and nanotechnology

[128] Their proposal has been subject to controversies (Lok and Willmott, 2006). Their analysis calls for greater attention to be paid to the process of institution building. They are also said to adhere to a realist view of institutions. We do agree with this point of view revealed by Lock and Willmott, but despite the lack of dynamic in Phillips et al.'s proposal, we retain here their endeavour to include discourse as such in institution building.

located in the French Alps. By contrasting the formatted discourse of the institutional entrepreneur with his discourse in the making, we highlight the succession and the overlapping of events and discourse. We are able to establish a reinforcing link between discourse and action, on the one hand, and action and discourse on the other hand, up to the institutionalisation of the centre. We base our analysis on narraction, a concept developed by Kahane (2000, 2005).

The goal of this article is to make a contribution to institutional theory. First, by focusing on the relation between discourse analysis and institutional work, we will empirically explore how an institutional entrepreneur imposes his vision of the organisation of the institutional field in which he is located and what work it entails by using discourse as a strategic tool. We argue that the vision should not only be presented or exposed, but that it also needs to be effectively demonstrated. We will show that the demonstration cannot only be based on narratives or rhetoric; proofs need to provide evidence of the validity of the discourse. These proofs are brought about by the occurrence of tests, which act as witnesses of the mobilisation process. They punctuate the discourse, reinforce it and push it further. Discourse is thus collectively built. For the institutional entrepreneur, designing tests is a way to expose his vision, to check the understanding and the enrolment of the target audiences, and to mark a specific moment in time. However, tests should not be understood in their most evident sense. Tests do have diverse functions, and they come to equip the institutional entrepreneur's discourse. The series of tests constitutes a support for the unfolding of the vision. This empirical result pinpoints a new strategy which allows the institutional entrepreneur to gain legitimacy. Legitimacy that is acquired at each step can be characterized, and can thus offer support to link action to certain types of legitimacy building. This study therefore also contributes to filling in the gap between discourse and legitimacy without using text analysis; instead, analysing discourse in the making allows us to unveil the multiplicity of discourses within a global one.

We begin our discussion by drawing on strategies to gain legitimacy in institutional theory literature and on the role of discourse, to finally argue that, as discourse in itself is immaterial, gaining legitimacy based on such an element is 'easier said than done' under circumstances of uncertainty that characterise institution creation. We shall then expose scholarly work on trust, which helps to emphasize the concept of testing. After that, we shall describe methods used to study the emergence of the Grenoble cluster in micro and nanoelectronics. A discussion follows deepening the self-reflection on the creation of an institution with the support of 'tests'. As a conclusion, we propose a starting point to characterise tests in different ways.

2 Gaining Legitimacy with Discourse

Discourse is an essential means for the institutional entrepreneur. Discourse is the medium through which the institutional entrepreneur communicates with his environment. But

more than that, the institutional entrepreneur can use language (constructing convincing arguments) to influence his position (Lawrence and Suddaby, 2006). This is why some authors even state that the work of the institutional entrepreneur is mainly to generate discourse, with the purpose of affecting the social constructions on which institutions lie (Phillips et al., 2004; Maguire et al., 2004). It is judged central to the institutional entrepreneur's efforts, especially when the field is in reconfiguration and new logics are being introduced (Suddaby and Greenwood, 2005). The following examples illustrate that the power of "discourse is the principal mean by which organization members create a coherent social reality" (Mumby and Clair 1997: 181): it is by using discourse that Kodak created "the Kodak moment", changing the way families were interacting with their past and their present moments (Munir and Phillips, 2005); it is the way in which whales were presented in a positive light in movies that changed macro discourse on the subject (Lawrence and Phillips, 2004); it is with the slogan "Strength Beyond Numbers" that accountants in Canada managed to change their identity (for themselves and their clients) (Greenwood et al., 2002: 64).

Discourse is a wide concept; in their introduction to the special issue on organizational discourse, Grant et al. (2001) listed the themes on which scholars work in relation to discourse analysis: metaphors; language and games; stories, narratives and novels; rituals; rhetoric; texts; drama; conversations; dialogue; identity; sense-making. This diversity offers the institutional entrepreneur as many ways and opportunities to interact with his environment as there are kinds of discourse. Scholars have identified a number of discursive strategies, which the institutional entrepreneur may use to convince potential supporters. Frame creation is a central one: "Institutional entrepreneurs can mobilize legitimacy, finances, and personnel only when they are able to frame the grievances and interests of aggrieved constituencies, diagnose causes, assign blames, provide solutions, and enable collective attribution processes to operate" (Snow and Benford, 1992: 150). Frame refers to schemes that allow individuals to make sense from their environment (Snow et al., 1986). Strang and Meyer (1993: 61) refer to theorisation as a central element of frame creation: "theorisation, [as] the development and specification of abstract categories and the elaboration of chains of cause and effect". Theorisation involves two dimensions: one that is linked to narratives and another to rhetoric. The former are "temporal chains of interrelated events or actions, undertaken by characters" (Grant et al., 2004: 63). Narratives are about building stories, but aim eventually to convince allies. Conviction is especially present in rhetoric because rhetoric consists of the art of persuasion: works targeting rhetoric are interested in the effectiveness of language in achieving defined goals and in changing social order. It therefore has a major impact in an actor's cognition. Suddaby and Greenwood (2005) show how it is possible to direct the interpretation of change by producing targeted rhetoric. Their case study illustrates how various actors involved in a profound institutional change, including the creation of a new organizational form, used different rhetoric based on an interplay of pathos, ethos and logos to justify the change of the accountant profession depending on the audience.

When words are not sufficient to convince actors, institutional entrepreneurs complement their discourse with tangible objects: examples include the development of contests to show the reliability of automobiles and encourage the development of the mass consumer market (Rao, 1994); the creation of a system (electricity in Edison's case) in which an innovation (the bulb) could be promoted (Hargadon and Douglas, 2001); the creation of a new measurement tool to measure social corporate performance by ARESE which led to the creation of a new industry (Déjean et al., 2004). In each case, institutional entrepreneurs illustrate their vision with tangible elements to increase the legitimacy and/or the credibility[129] of their proposal: by showing to the targeted public what it is they are saying, institutional entrepreneurs enhance the public's familiarity with the object (Mangematin, 2003), which should raise the level of trust in their proposal, and by extension, in institutional entrepreneurs.

When this is still not enough or when they have nothing to physically prove what they are saying, institutional entrepreneurs rely on a sponsor, a legal authority, a government, an externally and neutrally recognised organisation, or a well-known character/expert (Rao, 1994; Garud et al., 2002; Durand and McGuire, 2005; Demil and Bensédrine, 2005; Lawrence, 1999). This refers to transitivity, *i.e.* calling on a third party or on the institution to warrant the identity or the quality of the partners (Trompette, 2003). However, often these come too late in the mobilisation process. Their support is itself the result of the mobilisation effort provided by institutional entrepreneurs. So, we come back to the starting point: how can discourse initially support legitimacy building if it does not (yet) rely on sponsors or tangible elements[130]? This discourse ought to be assessed.

2.1 Developing Mechanisms to Assess Discourse

Assessment is an important concept in the literature regarding trust. One cannot blindly give his trust based on the potential partners' word or discourse: trust needs to be proved. This is why actors who doubt their partners develop mechanisms to assess them, so as to enter into a relationship in a safer way. Brousseau names such mechanisms "dispositifs de confiance" that we shall translate as "trust-enabling mechanisms":

> « l'étude des liens entre la confiance et l'échange problématique passe donc par l'examen d'un univers de délégués personnels et impersonnels qualifiés par des formes d'action spécifiques et qui instaurent et maintiennent d'autant mieux les relations de confiance entre les partenaires de l'échange qu'eux-mêmes bénéficient de cette confiance. Ces dispositifs de confiance sont en mesure de façonner la crédibilité […] engagements réciproques qui, en instituant des obligations mutuelles, permettent d'assurer la coordination entre agents » (Brousseau , 1996 :529)

[129] The point here is not to argue the differences between credibility, trust and legitimacy. They are all part of the same broader category that is mandatory in engaging different actors in a long-lasting relationship.

[130] Leca et al. (2006) investigate this question and argue that to understand the success (or failure) of the institutional entrepreneur, one need to consider both the discursive and the material dimension of the process he carries out. They show the importance to embody the approach in inscription devices. We shall refer to this in Chapter 7 as the discussion that we want to raise in this chapter deals with assessing the discourse.

Brousseau argues that the engagement of an actor in a relationship is not only linked to mutual dependence and a hostage game, like Williamson argues (1993). This is to say that trust is not only linked to the partners' respective interests, but it also depends on the degree of control that partners can maintain over one another (Trompette, 2003). For this reason, actors require proofs: Cleopatra requests her food to be tasted by her sampler (Mangematin, 2003), or policemen use biochemical means to test persons suspected of drug addiction (Devresse, 2003). These are qualified as trust-enabling mechanisms *i.e.* they come to prove one's discourse and help two parties to enter into a relationship. Granted, these are one-time tests, and trust in a partner requires most often an accumulation of proofs to ensure his reliability (Gomez et al., 2003; Lorenz, 2003). As Zimmerman and Zeitz (2002) argue, legitimacy is a continuum: it is not only a question of to have or not to have (Zimmerman and Zeitz, 2002), but rather it requires strategies to be articulated in order to acquire some more legitimacy, building on one's already existing one (Durand and McGuire, 2005). Moreover, proofs to be recognized as valid are subject to the acceptance of the audience that asked for it (Fernandez, 2003). Actors need to recognize as relevant the criteria on which the test is designed.

2.2 Narraction as Trust-Enabling Mechanism

The previous two paragraphs have been developed in such a manner to support the following: tests needs to be organised to fulfil the role of trust-enabling mechanisms in situations where discourse is the principal element of mobilisation. Kahane (2000, 2005) proposes the notion of narraction that is highly relevant to the present discussion. He believes that narration can be strategic, i.e. able to orient actions so that they transform reality. The author calls this phenomenon narraction. Kahane argues that starting from real elements, a discourse or a narration uses fiction to project a vision and to guide actions. This first step induces a transformation of the reality due to the occurrence of actions, which allows fiction to meet reality on which narration can be built again. In a nutshell, Kahane's slogan "a narration for and by action" means that narration leads to action that reinforces further narration[131].

In the present discussion, one could sum up the concept as the fact that narration is punctuated by a series of actions which validates each phase of the narration and allows for further narration (and actions) to occur. These actions may be interpreted as tests because their occurrence is the testimony of the acceptance of the content of the discourse by an audience, of the linkages between different events that the speaker has promoted, etc.

In this chapter, the hypothesis that shall be tested is therefore the following: the institutional entrepreneur, who works at convincing supporters to follow his vision, needs to provide proofs of the veracity of what he promotes with his discourse; for this purpose, he designs tests, enabling trust mechanisms, that shall come to support what he says. This

[131] Under specific (internal and external) conditions. But this is not the point here.

is to say that the institutional entrepreneur does not only illustrate/show his vision; he also demonstrates/proves it. Narratives or rhetoric contribute to the demonstration, but words, in times of uncertainty that characterise situations of institutional change, may not be strong enough.

3 Methodology

A single in-depth qualitative case study is adopted because the point here is to demonstrate in detail another aspect of the institutional entrepreneur's work. This kind of work therefore requires such case design. This case was selected because of its appropriate characteristics compared to the hypothesis of what was announced. First, the case clearly points to the way an actor, Jean Therme, hereafter described as an institutional entrepreneur, acts in order to mobilise resources and support with the aim to create a new institution (Maguire et al., 2004; DiMaggio, 1988). Textbox 1 provides the reader with a chronology of events in the construction of the institution. The vision J.Therme tries to impose upon local actors of the microelectronics industry is his personal vision of how this industry should be organized in the transition towards the nanoscale era. It includes the ways actors within the field should interact (around technology platforms and via specific research programs); it also entails reward and control mechanisms (via project selection); as well as who the actors should be (redefining their identity as the first European centre in micro- and nanotechnology), and why they should act this way. This is why we consider it to be an attempt at institution creation; an institution in the making, a proto-institution (Lawrence et al., 2002), which becomes a full-fledged institution as it becomes socially accepted and as it diffuses. The fact that several microelectronics centres throughout the world follow the same trend as Grenoble tends to support my argument that the new organisational arrangement of actors in the microelectronic industry is closely linked to the emergence of a new institution.

The Grenoble site is particularly well-suited for a discourse-based analysis because J.Therme's promotion of the new institution rests essentially on his discourse[132]: as a result, he met more than 950 people at all geographical and organisational levels during 102 public presentations over a two-year period. The analysis of the discourse emphasises its evolution as the institution in the making takes shape. The various graphical representations that J.Therme used to describe his vision are exploited as indicators of the evolution of the discourse.

[132] J.Therme's discourse is the first element in his overall strategy. Over time, he constructed other speakers who replicate (duplicators) and broaden (multipliers) his initial discourse in diverse environment. This point is the object of Chapter 7.

Textbox 1 Chronology of main events in the creation of the new institution

1998 – Jean Therme is recruited in Léti after 10 years in the industry

1999 – Léti 2000-WG

2000 – INPG board agreement to join a common project with CEA-Léti
2000 – PMT Léti (Medium and Long Run Program)

2001 (June/July) – Vote by local and regional public authorities to support Minatec
2001 (August) – CEA general director agreement to support Minatec
2001 – NanoBio initiation

2002 (January) – Memorandum of agreement signed for the funding of Minatec
2002 (April) – "Alliance" Agreement between ST Microelectronics, Philips and Freescale
2002 – OMNT
2002 – Nano2Life Network of Excellence (NoE) supported by the European Commission

2003 – RTB National Program
2003 – Nanotec 300 Program
2003 – Ideas'Lab creation
2003 – INERA funded

2004 – NanoBio Program (officially funded)

2005 – Minalogic (pôle de compétitivité label)

3.1 Research Site

Grenoble's face was completely transformed over a five-year period. Its two faces, the past and the current ones, are antonymous: the first highlights a region mostly unable to cope with radical technological advances. This situation is the one that characterises Grenoble in the late 1990s. It is not to say that the region was not promoting innovation, but rather that it was trapped on a trajectory that since the 1960s permitted the region to be highly dynamic. The region built its success on an accumulation of knowledge in electronics, informatics and physics, which, with the establishment of a national nuclear energy centre (CEA), Grenoble as well as engineering schools grew mostly endogenously, providing the region with many start-up and spin-off in the microelectronics field, among which EFCIS (seed of the worldwide player ST Microelectronics). However, Grenoble in the late '90s was facing difficult times and its most important electronics laboratory, CEA-Léti, with 600 employees and whose resources depended on the amount of industrial contracts, was in danger to be shut down. On the contrary, its second face points to a dynamic region creating a structure mimicked to a certain extent by others throughout the world (2005-2006). Indicators of the change are found in the fact that multinational firms changed their behaviour in respect to their localisation strategy and set up common laboratories or research centres on site, and in the fact that CEA-Léti now counts 1200 employees.

3.2 Data Collection

The research initially started with the aim to understand the so-called Minatec agreement, based on archive work. However, as the research project continued, it appeared that the face of the region was still in the process of evolving and that its re-design was not yet finished. We were a first-hand witness of the continuous changes and had a unique access to all archives of the leader of the transformation, Jean Therme, which, to avoid a single voice to pervade our analysis (Hardy, 2001), was completed, with interviews at the local and national levels. As changes were accumulating between 2002 and 2005, the scale switched to a higher level and the popularity of the place grew steadily; events, for example, were reported in national and international newspapers. If the work of the institutional entrepreneur is presented as the unfolding of a vision, the effective enrolment is verified by the outcome of the mobilisation itself, verifiable by interviews, secondary data, newspapers and industry articles or other sources.

4 Case Study

The case study is based on J.Therme's own discourse. Figure 1 depicts it as he presented it to us. It was then represented in a cartoon format to ease the understanding and to offer a broader assessment of the situation. It represents the discourse as it stands in 2004: a discourse carefully organised and built, logically ordered, formatted to answer most questions concerning the organisation of the actors in the Grenoble region.

We counterbalance this discourse with the discourse in the making. We provide contextual elements and details on the events and actions as they occur. Thus, the main steps of the constitution of the new institution are emphasised. Their timing may thus be different than the one presented in the formatted discourse. We can point to the differences between the initial design of the project based on the way the vision was exposed and its concrete realisation.

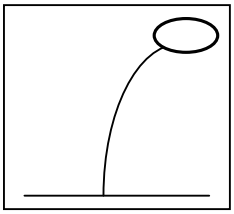
For this purpose, we use elements of J.Therme's discourse as they are used when the discourse is constructed step by step. All slides that were used are extracted from J.Therme's own presentations of the institution in the making.

4.1 The Institutional Entrepreneur's Vision

Figure 1 J.Therme's Cognitive Vision: Transformation of the Region Resulting From the Building of Minatec

The emergence of the new institution was conceived with the following timing. This is the vision of one actor as he told himself the story. This is his rationalisation of the project implementation in 2004. He labels his vision : " the Daisy"

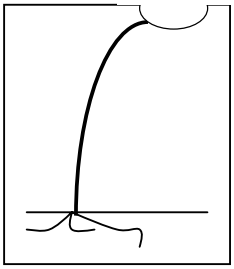
CEA-Léti in the 90's is the heart of the flower with its strong technological core in microelectronics



Léti tests a new national program, RTB*, with the aim to explore new technological opportunities in a medium to long-term horizon. The program connects engineers from an applied research background (Léti) to scientists in basic science (university laboratories in Grenoble and in France). The result is that local and national environments enrich Léti's knowledge base.

**Recherche Technologique de Base*.
(Technological Basic Research)

RTB program as the backbone for Léti's long-term innovative strength

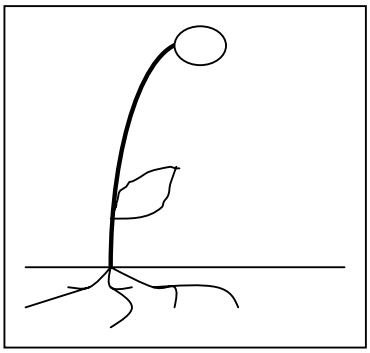


In parallel, Léti reinforces its connection with its environment: MiNaTec institutionalised collaborations with all partners within the microelectronics industry, thus offering more visibility as a centre moving towards the nanoscale.

The reasoning is that the core knowledge base needs to be constantly updated: university is a straightforward partner to the institution. As knowledge needs also to be translated into innovation: companies, start-ups and spin-offs are welcomed on the same site.

Minatec, tryptique constituted of 3 wings – research, training, valorisation- is set up early 2002 for more than € 150 millions.

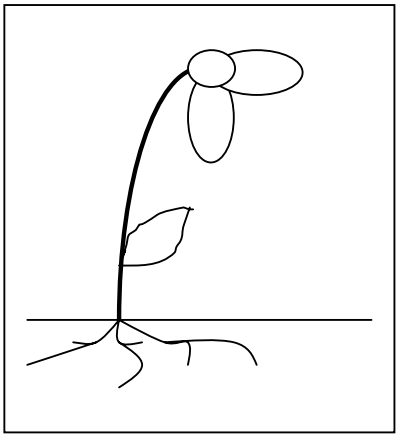
MiNaTec is the first leaf, a crucial support for the growth of a strong "Daisy". The core of the flower is taking shape.



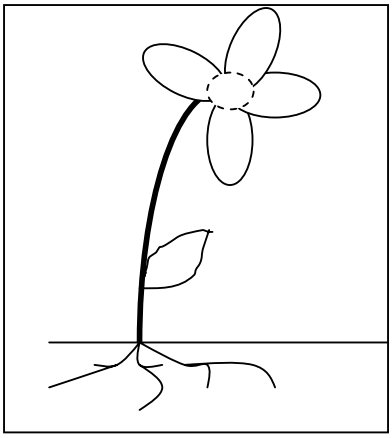
Nurtured by its environment, knowledge is translated in research tracks via the RTB program with the support of MiNaTec.

The first application platforms (Nanobio; New Energy Sources) are set up drawing from the knowledge accumulated.

Léti and its partners are now enjoying the first benefits of the organisation called "integration centre"¤



"Daisy" is at its mature stage. It develops application platforms (Nanobio, New Energy Sources, Communicating objects and Materials) around its core that diffuses knowledge around; the heart of the flower is supplied with updated and new insights from MiNaTec and its environment via RTB. The latter has been reinforced and is the fundamental spine for the success of the integration centre



¤ The notion of "integration centre" is presented in the introduction of the Ph.D. thesis

4.2 Reconstruction of the Vision Based on the Institutional Entrepreneur's Discourse

- Preparation of J.Therme's Argument: Léti 2000-WG

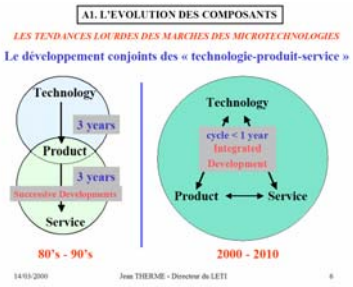
Despite the assets of the laboratory (20 years of experience in technological transfer, a portfolio of 110 new patents in 1999, and its number of employees), Léti[133] was facing a difficult situation at the beginning of the 21st century: "Our shelves [CEA-Léti's ones] are empty. We do not have any building blocks from which to draw to fuel industries with new technological solutions". It is with these words that J.Therme[134] begins his argument.

What lies behind this statement is that science and technology dynamics impose pressure on Léti because it is at the forefront of research and industries. Léti is an applied research laboratory whose budget essentially relies on industrial research contracts (Figure 2a).

Figure 2a Slide 1

Source: J.Therme's archive, Presentation to L.Schwartzenberg[135], Nov 9th, 2000

Figure 2b Slide 2

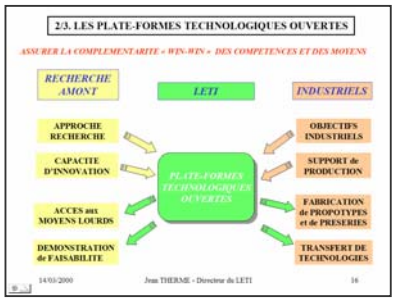


Source: J.Therme's archive, Presentation to PMT Léti[136] March 14th, 2000

[133] Léti is CEA-Grenoble's electronic laboratory, which is at the core of MiNaTec's technological strengths. CEA is a national research institute that counts 21 000 employees. Léti is just one laboratory regrouping 900 engineers, researchers and technicians.
[134] In November 1999, Therme is the manager of Léti. He is appointed as CEA-Grenoble's head in 2001.
[135] Léon Schwartzenberg is the French Research Minister in 2000.
[136] The presentation of the innovation pole to the PMT Léti was an important step as the laboratory was expected to play a central role in the new re-organisation of the Grenoble cluster. It rests on the analysis provided by Léti 2000 Working Group (cf here after). PMT Léti meeting organised the evolution of the laboratory for the next 5 to 10 years.

As innovation cycles shorten due to market constraints, Léti needs to be able to provide its industrial partners with technological solutions at a higher time rate. In order to do so, Léti should enhance its relationships with basic research laboratories and organise them around technological platforms (Figure 2c).

Figure 2c Slide 3



Source: J.Therme's archive, Presentation to PMT Léti, March 14th, 2000

Note[137]: These conclusions only come as a result of an investigation managed by J.Therme in 1998-1999 called "Léti 2000 WG" (Textbox 2). Indeed, Léti is a technology laboratory, and therefore the cohabitation with basic science laboratories around common platforms or the determining of common research programs is not straightforward. Within the Working Group, he devoted time to ensure the engineers willingness to work with basic research scientists and vice-versa. He himself claims that he tested the possibilities to establish common research projects.

Textbox 2 Léti 2000 Working Group

To prepare J.Therme to his new position as Léti's head, CEA-Grenoble's top management mandated him to lead the think-tank composed of Léti's seven department managers. The objective was to anticipate the changes that would occur within a five-year period and to propose strategic actions (including major restructuring of Léti's activities or its shutting down). The scientific and technological perimeter of each department was investigated in-depth and resulted in eight conclusions (Léti WG, 1999). Only the ones essential to the understanding of the argument are detailed here.

1. The organization around technological means should be continued. Considering the weight of the investments realized over the past ten years, both in workforce and in technological tools, technological means should be at the heart of Léti's activities.
2. Nevertheless, the activities labelled "system" (i.e. the integration of various technologies) should be kept to tighten technologies. Indeed, the trend towards "system-on-chip" was the core of the future generation of components. The quality of the link between technology and system was therefore crucial for Léti during the five to ten year span.
3. Conclusive tests have been carried out to try out the possibilities of in-depth collaboration with basic research actors around technological platforms. PLATO also results from such an initiative. This organization was close to Léti's close competitor, IMEC, in Flanders.
4. Considering the willingness of INPG to relocate close to Léti, there was an opportunity to integrate all the activities to create a unique platform in Europe. This would constitute an important attraction force for basic research scientists. A new building contiguous to those of Léti could be built to host current and forthcoming activities. This new building, for which public support should be sought, could provide space for the common Léti-INPG training centre, CIME (Centre de Ressources en Formation aux Microtechnologies).
5. Léti should be reorganized so as to take these elements in consideration.

[137] These notes provide a second level of analysis to the presentation of the unfolding of the vision. They point to specific elements that will be discussed in the following section of the chapter.

- First Elements Being Realised: RTB Program and the New Building

Based on the conclusions provided by Leti 2000 WG, which were re-used by J.Therme in his proposal for the PMT Léti, two strategies were developed: RTB program launched at the national level fulfils the objective of increasing linkages between basic research scientists and engineers around research project (Textbox 3), while the construction of innovation centre answers to the requirement of integrating different technologies (Figure 2 d).

Textbox 3 RTB program

RTB program stands for 'Recherche Technologique de Base" (Basic Technology Research), and it was negotiated by actors of the microelectronics industry. Therme was highly involved in its design being the head of the largest technological platform in the field.

Initiated in 2001, the program was funded after two years of discussions by the French Ministry of Research for a total amount of 100 million Euros over 4 years.

The program was articulated around what is called the national network of large technology platforms (called RMNT 'Réseau national des grandes centrales de technologie'), which brings together laboratories from CEA and CNRS in seven different locations. The purpose of the network was to use the resources and competences as they already existed and to reinforce them by providing partners with large equipment (infrastructure) and competitive grants to develop nano-focused research.

CEA-Grenoble chose¤ to focus its program on the research aspect rather than acquiring more pieces of equipment, considering that MiNaTec's industrial partners would first require intellectual property. Jean Therme and Léti's scientific advisor, J-F.Clerc, used to qualify the situation by arguing that: "the shelves are empty. We need to fill them up. We need building blocks". In a context where internal funding was decreasing (from 80% to 20% of the overall budget), Léti was missing funding to provide research to refurnish the shelves: indeed, with this objective, Léti required a longer-term perspective than the short-term contracts and focused subjects that it was getting.

In terms of intellectual property, the quote "we need building blocks" meant that Léti needed to renew its intellectual property (IP) blocks (generic patents) on which to develop technologies for industries that would fulfil their needs (specific patents) (and bring Léti research contract money – crucial for its survival considering the decrease of public funding).

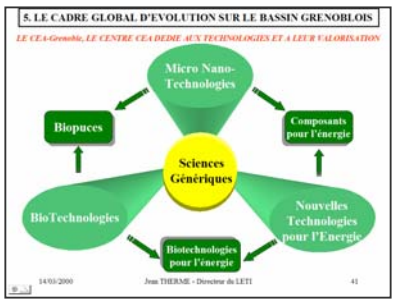
With the above considerations mentioned, the RTB program was thus designed as a link between exploration and exploitation, as a space to allow for interactions around a common project, the demonstrator. The 'demonstrator' is the intermediary step between concept and prototype; it allows IP to be taken, physical feasibility of the concept to be proven, and industries' interests to be caught because the physical device contains the vision of future markets. It is in this sense that it represents the link between generic and specific (application-oriented) patents. It also generates knowledge for the academic community: i.e. the integration of a micro battery on a chip led to knowledge concerning the interaction of surfaces that would be useful in research at the submicron-scale.

¤ Laboratories were indeed free to use the resources allocated to either infrastructure or research projects.

Note: The establishment of RTB program rested on Léti-WG conclusions (J.Therme and his scientific advisor, J-F. Clerc played a crucial role in the design of the program). The funding of the program at the national came to validate J.Therme's vision concerning the need to strengthen linkages between science and technology.

The innovation centre, which does not yet have a name is 2000, is presented as follows:

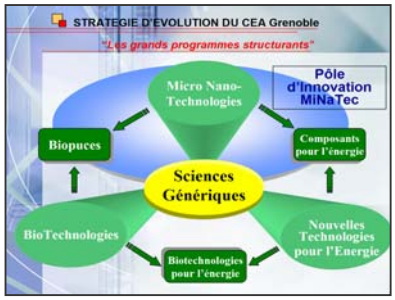
Figure 2d Slide 4



Source: J.Therme's archive, Presentation to PMT Léti, March 14th, 2000

In 2000, the discourse promoted an organisation around a core of generic competencies. Léti is not yet at the core of the new system as it is in the "Daisy" in 2004, as the discourse is retrospectively re-arranged. The core should provide building blocks that could be used in three technological areas: micro- and nanotechnologies, new technologies for energy, and biotechnologies. Note also that Minatec is one component of the project (Figure 2e). It is the first step in the establishment of the "integration centre".

Figure 2e Slide 5



Source: J.Therme's archive, Presentation to CEA-G staff, January 24th, 2001

The core of the innovation centre is to bring together all actors of the industry. It is symbolised by the funding of a new building (Figure 2f).

Note: we cannot define where Figure 2e stands in relation to Figures 2d and 2f. Getting the funds to build it is therefore another test in the unfolding of J.Therme's vision.

Figure 2f Slide 6

Source: J.Therme's archive, Presentation to L.Schwartzenberg,Nov 9th, 2000

The project requires an investment of €150 million to build the infrastructure (a new building). Jean Therme needs to convince both his own organisation (CEA, whose headquarters are located in Paris[138]) but also various direct and indirect backers[139]. Local and regional public authorities provide more than 60% of the required resources, while CEA brings 25% of the total amount. J.Therme seeks supports at the national (ministries and industries) and European levels (European commissioners and industries).

Textbox 4 Minatec's Set-Up (Funded in January 2002 – Initiated in 1999)

"Minatec adopts an integrated approach to innovation, from the exploration of technological breakthroughs to immediate industrial applications. This is essential to successfully negotiate the transition from advanced microelectronics to nanotechnology, evolve into heterogeneous micro components, and design tomorrow's smart devices and mobile terminals". (www.minatec.com)

It allows all actors of the microelectronics industry to face challenges together that the move towards the nanoscale brings. MiNaTec is first of all a real estate project: it is no more than a three-fold building that the signers of the statement agreed upon. CEA, INPG (Institut National Polytechnique de Grenoble¤) and public authority representatives jointly funded it on January 18th, 2002 for € 150 millions.

The idea behind MiNaTec originally emerged in 1999. MiNaTec comes as the fusion of two independent projects. Claude Gaubert, INPG Deputy President explains its genesis as a 'percolation' phenomenon: "looking at both projects on a map, there was our project [project 1] on this side of CEA and ZHT project [project 2] on the other side. They were next to each other. Then, BANG!!! Jean [Therme] saw that the two projects were deeply complementary one to the other. The pole of innovation in micro and nanotechnologies was born!" (Interview with C. Gaubert, 2004)

- Project 1: INPG has a relocation project for two of its engineering schools to move them out of the university campus and to relocate them close to CEA where most of the physics activities are located. The origins of the project can be traced back to 1985, but funding could only be provided in 1999.
- Project 2: CEA-Grenoble and Grenoble city councils were in discussion since 1997 to set up an industrial valorisation zone (ZHT – Zone de Hautes Technologies), but after two years of work, no agreement could be reached.

¤ INPG is a consortium of 9 engineering schools (1600 students) among which ENSERG (electronics) and ENSPG (Physics)

[138] Local sites benefit from a relative autonomy, but strategic plans need to be ratified at CEA's Paris headquarters.

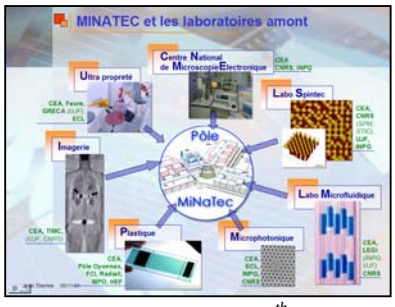
[139] Details are provided in Chapter 6. An analysis of audiences present at Therme's presentations and an analysis of his diary enable us to track the organisational and geographical origins of resources and supports.

Note: CEA general manager agreement (August 2001) and votes by local and regional public authorities (June/July 2001) were crucial moments in the creation of the institution. Would one of them, only, had refused to support the the new building set-up, the entire institution creation would have aborted.

As a result, the innovation centre, called Minatec, will articulate two dimensions:

- **Competencies**: between the complementary worlds of basic research (academic laboratories), applied research (applied research such as Léti) and industrial research (Figure 2g). The RTB program brings them all together around specific projects with the aim to produce new generic intellectual property blocks.

Figure 2g Slide 7



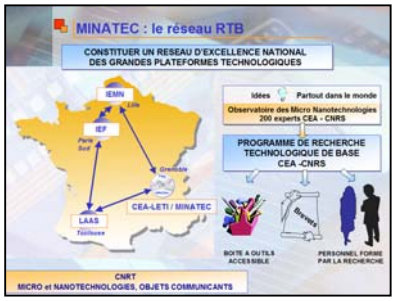
Source: J.Therme's archive, presentation to DIR Leti,Nov 30th, 2001

Moreover, in 2002 CEA-Léti and CNRS set up the Micro and Nanotechnology Observatory (OMNT - 'l'Observatoire des Micro et Nano Technologies') which rationales is defined in the following terms:

> "to speed up detection of weak signals announcing breakthroughs in micro and nanotechnology. It instituted a unique approach to technology intelligence, networking 150 scientific and technical experts in France's main research organizations, representatives of specialist advanced-technology market-research consultants and venture capitalists." (RTB pre-agreement of understanding, 2002)

Located in Grenoble, OMNT is an essential tool, complementing the RTB program (Figure 2h).

Figure 2h Slide 8

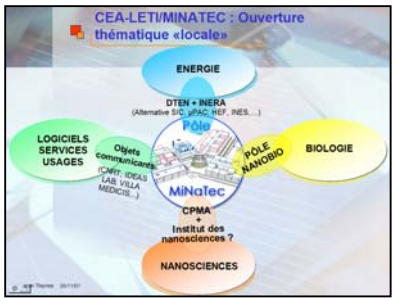


Source: J.Therme's archive, presentation to DIR Leti, Nov 30th, 2001

Application platforms are designed to use Minatec's generic scientific and technological strengths for specific groups of applications. This is the core principle of what is called the "integration centre".

- **Applications**: once generic patents have been created, they are transferred and customised for different industrial applications. Work is thus also organised around application platforms (Figure 2i).

Figure 2i Slide 9



Source: J.Therme's archive, Presentation to DIR Leti, Nov 30th, 2001

Minatec is now designed as the core of the system, with Léti being at the heart of its core. It is no longer an application platform on its own, as shown in Figure 2d. The couple CEA-Léti/Minatec provides generic tools and concepts (referred to here as the generic tools, concepts and IP blocks) that will be adapted for particular purposes. The application platforms are designed to make other tools and competencies available to translate Minatec's findings to industrial partners. Therefore, new investments in competencies, machinery and building are requested for each application platform.

- Next step: setting up platforms

The first two platforms[140] to be promoted are the biological platform (Nanobio) and the New Energy source. They are presented as early as 2001, along with J.Therme's own presentations (Textbox 5).

The idea of application platforms is present as early as 2001, not within a Daisy, but a within a three leaf-clover format:

> "Imaginez le CEA Grenoble en 2010… Parions que le pôle NanoBio qui explorera un nouveau domaine à l'intersection de la biologie et de la physique aura pris forme… La stratégie du CEA Grenoble s'illustre par un trèfle. A chaque feuille du trèfle est associé un "programme structurant" c'est à dire un projet spécifique multipartenaire. Le pôle Minatec est dévolu aux micro et nanotechnologies, INERA (Initiative Nouvelles Energies Rhône-Alpes) aux nouvelles énergies et NanoBio aux nano et biotechnologies. Ouverts, ces programmes fédèrent la recherche, l'enseignement et l'industrie. De nouveaux terrains de recherche apparaissent entre les trois lobes

[140] The two other platforms are not present in the 2004 Daisy.

de la feuille, au CEA Grenoble on appelle cela l'interdisciplinarité." (Chronique du CEA. N°69. Automne 2001).

Textbox 5 Initial Application Platforms

- NanoBio

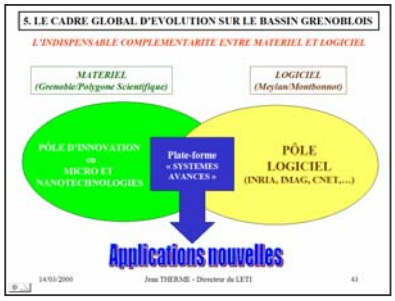
Initiated in 2001, NanoBio is a platform devoted to health and biological applications of micro and nanotechnologies that brings together around 300 CEA-Grenoble's, Jean Fourier University[¤]'s, CNRS's and INSERM's researchers (engineers, biologists, physicists, chemists and physicians). NanoBio is officially funded in October 2004 with the support of local public authorities and a €45.2 million investment. It aims to develop synergies between diverse disciplines and to reach new miniaturized tools for analysis, diagnosis and therapy (lab-on-chip, biocaptors, bio-chips). It takes on an even larger scale with the funding at the European level of the Nano2life Network of Excellence.

[¤] Jean Fourier University (UJF) is the Grenoble science and technology university. CNRS is the national research centre that possesses laboratories in all scientific disciplines. INSERM is the health national research centre.

- New Energy sources (INERA)

Funded in 2003, the INERA (Initiatives Nouvelles Energies Rhône-Alpes) is a national-scale initiative to bring together research laboratories (CEA-Grenoble, INPG, Savoy University) and industries (Schneider, Air Liquide, GEG, EDF). The program promotes scientific and technological collaborations to diversify renewable energy sources using competences in micro and nanotechnologies.

Figure 2j Slide 10



Source: J.Therme's archive, Presentation to PMT Léti, March 14th, 2000

As J.Therme's quote in Textbox 5 shows, communicating objects constitutes an important application market. As Figure 2j and the Léti 2000-WG report show, the linkages between software and hardware is crucial.

Initially expected to include the greater Grenoble area and to take the form of a platform in 2001 (see Figure 2i), a 2005 national call for projects (the pôle de competitivité call) offers the opportunity to increase the scale of this last platform to include actors within a 150-kilometre distance (Textbox 6).

Textbox 6 The Software/Hardware Platform: From Ideas'Lab to Minalogic

- Ideas' Lab - funded in 2003

Ideas' Lab is the first effort within the Grenoble transformation to incorporate software developments to micro- and nano- electronics innovations. It comes as another experiment to foster creativity and bring together scientists and engineers from various disciplines. Originally imagined in 2001, it is officially established in 2003. "It brings together experts, industrialists, research engineers and researchers in the human and social sciences with a view to designing tomorrow's micro- and nanotechnology applications. A twofold approach involving creativity and usages combines the power of technology with the insights of users to give birth to pertinent innovations. The laboratory and its partners aim to generate ideas, evaluate usages, and create products and services that are of genuine value by breaking down the barriers between individual disciplines." (www.ideas-laboratory.com). Ideas' Lab is explicitly linked to MiNaTec as its full denomination is MiNaTec Ideas' Laboratory.

- Minalogic Pôle de Compétitivité – funded in 2005

A national call for projects "Pôles de compétitivité "was launched in November 2004 by the French government. "Pôles de compétitivité" are defined in the call as "a combination, on a defined territory, of firms, training and research centers, which are engaged as partners in a relation aiming at promoting innovation. Engaged actors should represent such a critical mass to be internationally visible". Four aspects are central to be awarded the label (www.competitivite.gouv.fr):

> "(1) The local economic fabric underpinning a cluster's economic development strategy must be dynamic and effective compared with the international competition;
> (2) A cluster's strategy must be consistent with the broader economic development plan for the entire region;
> (3) A cluster must be industrially and/or technologically visible at international level. In time, proposed projects must have world-class potential in their business line;
> (4) A project's partnership structure and governance method are essential aspects. The quality and efficacy of R&D partnerships between the players (manufacturers, researchers, teachers) are important cluster defining criteria".

Six projects with an international dimension were awarded the label and compete for more than € 1000 million in grants over a three year period. The project called Minalogic, supported in the Grenoble area, is one of them. Minalogic stands for MIcro NAnotechnologies et LOgiciel Grenoble-Isère Compétitivité which can be translated as Competitiveness for the Grenoble-Isère area in micro – nanotechnologies and software technologies. Industrial leaders are partners in the project (Thalès, ST Microelectronics, Philips, Motorola, Bull, Radiall). It allows for the funding of the last theme of Minatec's initial segmentation of activities (Figure 2h), and brings the project to completion. Being granted the label is also a sign of national recognition, which finalizes the institutionalisation of the Grenoble cluster (Delemarle, 2006). It also brings a critical mass of more than 5000 researchers in microelectronics to the area; to which one can also add researchers in biology or informatics.

The last platform that is not presented in the 2000 and 2001 discourse in the making, but which is present in the 2004 Daisy, is the material one. Its building results from the set-up of a specific collaborative scheme with three leaders of the semi-conductor industry (Textbox 7).

Textbox 7 The Material Platform: 'Alliance' – funded April – 2002 followed by Nanotec 300 – funded mid-2003

This platform is funded in the context of an alliance between three industrial partners. The so-called 'Alliance' regroups Motorola, ST Microelectronics and Philips. The newly built consortium becomes number 2 in the world in the field of micro and nanotechnologies behind Intel. The signature of the agreement between the three giants represented the largest industrial investment in France since the early nineties (3 billion dollars over a five year period). It can be said that this investment is directly linked to the emergence of MiNaTec and that it was included in the initial plan despite not being revealed at the very beginning. However, what was included in the vision was the development of a new 300mm platform (to attract large industrial partners to set up on site) : the 'Alliance' agreement came as the opportunity "to kill two birds with one stone".

Initially, Motorola was interested in partnering with CEA-Léti following the same scheme as Léti and ST Microelectronics° existing collaboration; but Léti could not provide the large spectrum of technologies that Motorola would require, nor could MiNaTec as it was in early 2002: indeed, it did not possess the infrastructure† to support research that would be needed for the next generation of components. Therme proposed to Motorola Europe Management to create a research consortium with ST microelectronics, whose new structure in Crolles 2 would be able to accommodate most of Motorola's needs◊. However, the proposal was risky for Therme, who could loose the game entirely: Motorola was at the same time looking to set up its research centre in Taiwan rather than in Grenoble if it could not find what it was looking for. Therme justified his action to his hierarchy in Paris by arguing that "when Léti's industrial partners go well, so does Léti" (Ballu, 2006: 161), implying that if Motorola set up in Grenoble, it would generate research contracts for Léti via MiNaTec. Therme mediated between ST Microelectronics and Motorola to set up a joint research program that was also joined by Philips. The underlying idea was that the amount of investments required was so high that a single company could not achieve the results fast enough to remain competitive at the international level. An alliance offered each of the three partners an exclusive research access and the opportunity to develop the building blocks that each of the partners could then exploit for specific applications.

The 'Alliance' agreement was signed in April 2002 at the French Ministry of Industry. Following the same contractual terms as those for the Léti and ST, research funded by 'Alliance' would be carried out in Léti's clean rooms (newly set up in MiNaTec and Nanotec 300 platform). The latter was funded a year after the 'Alliance' agreement with a €60 million investment for CEA headquarters.

"Nanotec 300 completes "Minatec plan": Minatec deals with components and systems, while Nanotec 300 targets tomorrow silicium technology i.e. 300mm and nano scale technologies […] Léti, Minatec and Nanotec 300 form a complete plan which will be reinforced with biotechnologies, nanosciences, communicating objects, energy microsources " (Therme, 2002 in Chronique du CEA Grenoble – appurtenance to n.71)

° Links between Léti and ST Microelectronics are very tight (EFCIS, which is the core of ST Microelectronics is a start-up from Léti). The two organisations have been setting up multiple research programs around CMOS technology on 200mm wafers (wafers circulate between both location: standard fabrication stages are realised at ST's Crolles facility while advanced one are produced at Léti's one. An indicator, besides the revenues from research contracts, is the mobility of researchers. Léti and ST have research programs developed in a collaborative manner on a number of issues.

† At the time, infrastructures were set up to accommodate research on 200mm wafers. The international roadmap for semiconductors targeted 300mm wafer production facilities by 2005, which meant that research at this scale, should be running as soon as possible.

◊ ST Microelectronics had set up Crolles 2 (facilities able to work on 300 mm silicon wafer).

Note: the investment of the industrial partners resulted from RTB and the new building set-up. Negociations between the partners (included J.Therme) were carried out as Minatec memorandum of agreement was not yet signed.

5 Discussion

What does the contrast of the 2004 "Daisy" formatted discourse to the 2000 and 2001 discourse in the making illustrate? First, it points to differences between what is presented in 2004 and what is presented in the chronology of events. It allows us to highlight important moments in the construction of the institution. It also shows that the institution is collectively constructed and that the discourse underlying its emergence evolves as the mobilisation process proceeds.

5.1 A Discourse Punctuated by a Series of Actions That Have a Self-Reinforcing Impact on Discourse

The case shows a difference between the discourse as presented to us by J.Therme in 2004, and the discourse during its evolution, re-constructed based on a selected sample of slides available from 2000 and 2001. There is no surprise in this as Figure 1 presents an ex-post rationalisation. What is striking, however, is that despite the fact that the institutionalisation process is not yet achieved – the institutionalisation process with Minalogic ends only in 2005 - J.Therme's discourse is formatted, fully explicative of the process in 2004: links between events are made[141] that allow CEA-Léti to reposition itself within the local and national landscapes. In Figure 1, Léti constitutes the core of the "Daisy" and all events concatenate from the funding of the RTB program to Minalogic's "pôle de compétitivité" label granting.

By arguing that the discourse is formatted in 2004 with the "Daisy", it means that further events which may occur do not add anything more: the discourse stands on its own, it is credible and robust. We argue that the narractive process is finished, *i.e.* the "Daisy" discourse results from past actions but does not intentionally lead to further ones. But the analysis of the discourse in the making shows that J.Therme, the institutional entrepreneur, transformed fiction to reality by using a step-by-step self-reinforcing process called narraction (Kahane, 2005). What underlies this concept is that narratives (discourse) lead to a first action which is reinforced by achievement and thereby completing the initial discourse. Therefore, discourse is a strategic tool, and not only a medium of communication used in the process of institution creation. J.Therme's initial proposal to set up an innovation centre justified by science and technology dynamics induced an action: backers joined the mobilisation process and funded Minatec, which enhanced the project of new institution's legitimacy, bringing new partners to the coalition. It is because of this action that Motorola decided to set up its laboratory in Grenoble and to join forces with Philips and ST Microelectronics. This event enriched J.Therme's discourse and the credibility of his vision, which he could then unfold further when asking for additional actions: as a result, the material platform, Nanotec 300, was funded. Therefore, the issue of the actors' engagement in the new institution building

[141] These links translate Therme's appreciation of the situation.

cannot simply be solved by answering the question: "can I trust this institutional entrepreneur's discourse, his vision and promises?" There is no binary (yes/no) answer, but an enrolment process that results from an accumulation of events and a self-reinforcing movement.

5.2 A Discourse Made Out of Tests

We argue that each of the events that punctuate the discourse refers to a test. These are organised along the discourse creation and unfolding, which, if successful, reinforce the discourse and allow passage to the next step. Institution building is achieved by a trail of experiments, a series of tests, which build in a progressive manner its legitimacy. Each test, *i.e.* each validated action, reinforces discourse, and discourse in turn proposes further action. Tests are therefore characterised of trust-enabling mechanisms: they allow actors to engage further into the project. The signing of the "Alliance" collaboration scheme is interpretred along these lines.

Each test has an impact on the stock of legitimacy of the institutional project or of its supporters. This trail of experiments can be used as a measurement tool to evaluate the increase in legitimacy: from high to low, legitimacy is therefore a continuum as Zimmerman and Zeitz (2002) argued. The labellisation of Minalogic as "pôle de compétitivité" by national public authorities resulted from the high degree of involvement of the actors who joined the project based on the accumulation of proofs of the relevance of Minatec innovation centre.

Crucial is the fact that tests are not milestones defined on a trajectory, but that they are events that occur during the course of action, as in the case of path creation (Garud and Karnoe, 2001). The project is evaluated as it and its environment co-evolve: its credibility compared to the environment is tested, or as explained by Rip, its robustness is assessed (Rip, 1986). The example of the NanoBio platforms comes to illustrate this point. The proposal of their funding is indeed, in the context of this discussion, a test: their successful set-up validated J.Therme's vision of the integration centre. One could say that the criteria of selection required by the backers were fulfilled. But this is not true because their design evolved as supports were mobilised: this explains why Nanobio was initiated in 2001 but funded only three years later.

Using a broader perspective[142], Latour highlights the role of 'collective experiments', or socio-technical demonstrations (1998). These terms fully explain why the vision discursively promoted cannot only be shown, but that it must be demonstrated, tested. The comparison is relevant because radical innovations as institutions emerge in circumstances of uncertainty. In Latour's work, the experiments or demonstrations are designed to test assumptions that arise in the context of innovation creation. Hence, innovators facing

[142] Latour includes all elements that may affect the development of radical innovations (technical, social, political or economic elements),

conditions of high uncertainty need to evaluate its fit within its current environment. Latour also refers to the innovation 'trail of trials' (2001): an innovation project should not be seen as a sequence of idea-concept-development, but should be seen as a "a trail of trials in which projects subject themselves to the course of progressively testing the relevance of hypothesized configurations of human and non-human actors" (Laredo et al., 2002: 21). This also means that the mobilisation capacity of the innovation is put to the test at each trial[143], or said differently, that tests finish by checking the engagement of actors in the coalition (for example, we refer here to the new building funding).

This last argument is central and it induces a re-definition of "test", a word that we have not yet precisely defined. Test is usually defined as "the means by which the presence, quality, or genuineness of anything is determined; a means of trial" [144]. This definition implies that criteria, to which objects under test are subjected, are developed. However, in situations of uncertainty, it is not possible to determine any criteria. Instead of criteria of evaluation, we would speak of criteria of relevance for a particular audience. Tests in "certain worlds" are different from tests taking place in "uncertain worlds". We therefore propose in the following sub-section the first steps towards a characterisation of the notion of test.

5.3 First Steps towards the Characterisation of "Tests"

We have highlighted the fact that the notion of test should be understood in a different sense from that used in "certain worlds". We would like to propose a further elaboration of this notion. We consider that most events outlined in Textbox 1 may be characterised of tests. We first refer to "narrow or broad test" before proposing three types of tests.

- "Narrow test" vs. "broad test"

Before the actual test, "narrow tests" are organised informally or in limited settings so as to limit risks. In a conversation analysis framework (Sacks, 1984), one would call these actions pre-type actions. Léti 2000-WG is such an action: before proposing to basic research laboratories to collaborate with engineers, J.Therme organised meetings to assess the likelihood of success of the proposal. Exactly in the same spirit, J.Therme established laboratories including both biologists and engineers before NanoBio were funded: this hidden trial allows him to assess the possibilities of success of a similar initiative at a larger scale. The high support to Nano2Life (2002) whose headquarters are located in CEA was also a "narrow test" as it tested in a different setting the opportunity to set up a NanoBio platform in Grenoble. Similarly, Ideas Lab, funded in 2003, was an informal test, to check the possibilities to set up a larger platform incorporating software to hardware i.e. Minalogic funded in 2005.

[143] Callon's obligatory passage point (1986) can also be read from this perspective.
[144] test. (n.d.). *Dictionary.com Unabridged (v 1.0.1)*. Retrieved November 12, 2006, from Dictionary.com website: http://dictionary.reference.com/browse/test

On the contrary, we also consider "broad tests" which are found in J.Therme's cognitive vision (Figure 1 – the "Daisy"). After the test, the discourse incorporates its result. We find incorporated in "Daisy" the acknowledgement of:

- Léti as the core of the flower: this, however, was not straightforward from the start of the project because this scheme implied a reorganisation of CEA-Grenoble, which needed to be accepted by the CEA top management level first;
- RTB program as the stem's sap channels: we already pointed to the difficulties in scientists and engineers working together;
- Minatec as the first leaf of the flower: it allows the essential elements of the flower to grow stronger (buildings, possibilities of close interactions, machineries and tools etc.).
- Application platforms as the flower petals: NanoBio (health and biology) and Nanotec 300 (materials) are the most important platforms.

These constitute different kinds of tests that will be discussed[145].

- Three Kinds of Tests as Tools to Legitimise the Discourse.

It is worthwhile to note the double sense that the term **"trial"** carries: besides its use as a synonym of "test", there is also a juridical sense of the term which describes an event where proofs are brought in front of a jury in order to be assessed. Tests expose one camp to another, increasing its visibility (Rao, 1994) and familiarity (Hargadon and Douglas, 2001) towards it, which, however, does not lessen the risks inherent to tests: those of possible failure. In this sense, it is the "defendant"'s own legitimacy that is at stake. For example, the votes by local public authorities in June and July 2001 or the J.Therme's presentation to the CEA general manager in August 2001 may be qualified of "trials". Would only one of them reject the project, it would have been irremediably stopped (as was the ZHT project). The success of the "trial" is to validate the enrolment of backers and to act as a tangible proof of quality: now all (CEA staff or various public authorities actors) have to support the materialisation of the project.

Does it mean that a test should only be understood as a "hit or miss" or "sometimes you win, sometimes you lose, and sometimes you're rained out" scenario? Not at all: the notion of test is larger than this simple frame.

A series of tests also comes close here to Thévenot's notion of **"investissement de forme"** (1985): tests act to anchor discourse (fiction) in a social world (reality) and the validation of each test appears as an investment that results from past ones, contributes to strengthen the discourse and prepares the way for new ones. They have the power to decrease uncertainty because they induce a sense of stability as they anchor discourse in

[145] J.Therme's 2004 formatted discourse does not present them as tests, but interviews with various actors and newspaper articles clearly point to what was at stake behind each of them

reality and in a sense of better mastering of temporality, as they compact time [146]. Minatec is the first "investissement de forme" because it physically anchors Therme's discourse to transform the region/CEA (depending on whom he speaks to) in reality. What can be more real than a new building right at the centre of the city, right in CEA Grenoble? Therefore, tests, if successful, increase socio-political legitimacy of the institution in emergence (Aldrich and Fiol (1994) [147]).
Moreover, "investissements de forme" pave the way for future action, and in a sense, thus prepare the ground for sense-making. It is therefore a basis from which cognitive legitimacy can be gained[148]. Minatec funding paves the way both to RTB and to further enlarge of the project (with the Alliance collaboration scheme and the platforms for example)

Furthermore, each test also **mediates** the discourse[149] (Latour, 2005), they transform the initial discourse: they come to enrich it by adding new components to the initial discourse. RTB program successful funding for exemple mediates J.Therme's discourse : it adds to it but also builds on it. Though it was still a test because its funding did not rest only on J.Therme. They support the effort of sense-giving that the creation/transformation of a new institution supposes. RTB gave sense to the construction of the new building: as the program rests on the close collaboration of scientists and engineers, the new building that brings together researchers and engineers makes sense.

The following chart illustrates the various roles that tests play in the institutional change process.

[146] If uncertainty may trigger institutional change, it is less suitable during the institutionalisation process. Tests therefore contribute to reduce uncertainty.
[147] We chose here Aldrich and Fiol's definition of legitimacy (1994), as the segmentation between socio-political and cognitive components are the basis for further typologies such as Zimmerman and Zeitz (2002) who distinguish regulatory and normative aspects within socio-political legitimacy. Suchman, for example, prefers to speak of pragmatic and moral aspects of legitimacy instead of socio-political legitimacy.
[148] The second component of legitimacy, its cognitive dimension, is depicted as "knowledge about the new activity and what is needed to succeed in an industry".
[149] "Mediators transform, translate, distort, and modify the meaning or the elements they are supposed to carry" (2005 :39).

Chart 1 The Various Roles That Tests Play in the Institutional Change Process

Tests as	Action	Result on the discourse	Result in relation to legitimacy	Example
"Investissement de forme"	*Embeds discourse in a social reality *Builds on past actions and prepare future ones	*Increases stability *Allows sense-making	*Adds socio-political legitimacy *Helps in gaining cognitive legitimacy	Minatec
Mediator	*Builds on past actions and discourses and contributes to paving future paths	*Allows sense-giving	*Adds cognitive legitimacy	RTB program
Trial	* "Hit or miss"	*Validates enrolment *Acts as a demonstration	*Adds personal legitimacy (trust, credibility, reputation)	

Note that tests do not only belong to a single type. Minatec, for example, falls under both the categories of a trial and an "investissement de forme".

6 Conclusion

6.1 Elements of Conclusion

Using the requirements of legitimacy gaining as the starting point for creating or transforming institutions, we investigate the role of discourse in achieving this. We considered discourse to be more of a communication tool rather than a strategic one. Discourse not only shows or illustrates a vision; it also demonstrates or proves it. Discourse is a way to induce actors into an exchange or a relationship. However, due to its intangible characteristics, discourse may not be the ideal support for legitimacy gaining.

The case study of the institutionalisation process of Grenoble as a cluster in micro- and nanoelectronics points to the specific actions undertaken by an institutional entrepreneur to equip his discourse by resting and building on a trail of tests. By differentiating the ex-post rationalisation of the institutional entrepreneur's discourse with elements of his discourse in the making, we identified major steps that the institutional entrepreneur had to make in order to pursue the mobilisation effort. Each of these steps results from the work produced by the institutional entrepreneur based on his discourse; but each of these steps also comes to reinforce the existing discourse and to induce further action. This is Kahane's narraction concept.

Major steps are tests: different tests embed the discourse in the social reality allowing the institutional entrepreneur's vision to move from fiction to reality. The series of tests constitute an infrastructure for the discourse. The institutional entrepreneur can act to organise tests that will provide her/him and her/his project with enough legitimacy to achieve institutional change. The succession of tests builds, in a progressive manner, enough legitimacy so that the institution can finally be taken-for-granted. This is to say that the discourse is equipped to face counter-attacks.

6.2 Perspectives

Can this typology be helpful in better understanding the action of an institutional entrepreneur in creating a new institution? Focusing here on legitimacy, it highlights how test and the accumulation of them may eventually contribute to gain legitimacy for the institutional entrepreneur. It also points to type of actions s/he can promote to set up conditions for a test to occur with pre-test actions strategies, for example.

The step by step process of institutionalisation can also be linked to Lawrence et al.'s concept of proto-institution that they defined as "practices,technologies, and rules that are

narrowly diffused and only weakly entrenched, but that have the potential to become widely institutionalized, as *proto-institutions.* These new practices, technologies, and rules are institutions in the making: they have the potential to become full-fledged institutions if social processes develop that entrench them and they are diffused throughout an institutional field". (2002: 283). We tend to consider proto-institution as an incomplete institution, as a promise of an institution which still needs to gain more legitimacy. They are therefore tests, which if successfully validated, may lead to a full-fledged institution. They are close to either mediator-test or 'investissement de forme".

The study is very limited, but the propositions that have been made may be tested in other situations of institution building and the characterisation proposed may be refined.

Chapter 6 – Temporality of the Mobilisation Process Encountered by the Institutional Entrepreneur

1 Introduction

The work that institutional creation or transformation entails has been an object of central concern in institutional theories. The late 1980's turn, reintroducing agency, allowed theorists to focus on actions that can be undertaken to support and promote institutional change. These agents are called institutional entrepreneurs: "A new institution arises when organized actors with sufficient resources (institutional entrepreneurs) see in them an opportunity to realize interests that they value highly" (DiMaggio, 1988:14). Scholars often describe strategies[150] used to gain legitimacy and resources in order to achieve this goal. However, "they tell us little about 'institutionalisation' as an unfinished process" as DiMaggio already argued in 1988. Indeed, the process as such is rarely uncovered. Examples that emphasise a process-based perspective on institutional change include: Garud et al. (2002), investigating ways in which Sun tried to define Java as a standard; and Lawrence et al. (2002) focusing on the role of inter-organisational collaborations in favouring the establishment of new practices. Both take into consideration the interactions between actors, but the interaction patterns studied are already set and therefore none of them really succeed in capturing the complexity of the activities that the institutional entrepreneur must manage in order to stabilise relationships and align actors. This article aims to fill in this missing gap by unveiling the micro-processes of the mobilisation process carried out by an institutional entrepreneur. If the question of how a new institution is created - which entails legitimacy building, and allies' mobilisation and discourse usage to carry the message - has been raised using a large array of perspectives, what has not yet been dealt with is the temporality of the process: when are actors approached to join the coalition? Do arguments to rally them evolve, and do they differ over time? These questions are related broadly to characterising the mobilisation process.

Sequence, linearity and pace are ways to qualify the process of mobilisation in institutional change. They are used here in the same manner as Amis, Slack and Hinings (2004) did. The three authors explore how these three characteristics of change affect the outcome of radical transformation. Pace[151] deals with the speed of change (fast or slow / radical or incremental) within organisations. Sequence points to the diverse strategies of change and to the order of the activities that introduce change. Last, linearity tackles the location of the introduction of the process and its spreading (from periphery to centre / from "high-impact" elements of an organization to low-impact ones). All three elements are intrinsically linked and difficult to isolate, which also explains why they have not been subject to direct investigation by scholars. Amis et al.'s starting point is that change literature has been the object of a considerable amount of work, but that either scholars

[150] The position of the institutional entrepreneur (Anand and Watson, 2004; Lawrence et al., 2005; Fligstein, 1997), his/her personal and social skills (Suchman, 1995; Fligstein, 1997), his/her professional occupation (Lounsbury, 2002) as well as the degree of institutionalisation of the field (Dorado, 2005; Maguire et al., 2004) are all factors that influence the capacity of the institutional entrepreneur to promote change.

[151] We here use Amis et al.'s definition of the three terms.

propose ambiguous, even contradictory, findings (in relation to speed and sequence of the process), or that they do not directly consider their importance (particularly for the linearity and pace parts of the process). Based on a synthesis of empirical works, they propose hypotheses that they test using real time data collected over 12 years on a set of 36 Canadian olympic national sport organisations. They find that no support is needed for rapid pace of change, while they conclude positively on the necessity to induce early change to "high impact" organizational elements and on the non-linearity of the process. Amis et al.'s efforts to better understand the process of radical change within organizations has encouraged us to lead a similar work on institutional change occurring within a cluster of organisations. As them, we use as a starting point the lack of direct investigation in scholarly work on these issues in situations that we found in the institutional entrepreneurship literature.

The analysis that will be carried out here relies on an in-depth case study of the emergence phase of institution building. Mobilisation of resources and support constitutes the first component of the institutional entrepreneur's strategy to impose a new institutional model. It forms the first step in the institutional change process. We define this period as the one which runs until the first irreversibility or the first crystallisation moment occurs. We justify the focus on this specific time period as we consider it as the most intense one. However, this choice also leaves the issue of pace open, as the analysis of the change process is limited to only its earliest period.

The institution-in-the-making is the Grenoble cluster in micro and nanotechnologies, which presented striking cultural, normative and regulatory changes between 1999 and 2005. The first irreversibility is said to have taken place with the signing of the Minatec[152] agreement of understanding, which sealed the way towards the new institution. All actors involved in the construction recognized the role of an institutional entrepreneur in this achievement. Access to archives, used as records to follow the institutional entrepreneur's actions in the mobilisation process, permits the reconstruction of the micro-processes at stake by combining qualitative and quantitative methods.

The analysis proposes three main conclusions that contribute to institutional entrepreneur literature. Complementing Aldrich and Fiol's segmentation of audiences to mobilise (1994), and taking insights from Callon and Law (1988), we propose a redefinition of audiences in local network, global network and wider environment. We also show that a mandatory task for the institutional entrepreneur is to navigate between the three locations via multiple iterations. Each of the three has a specific role in the emergence phase of institution building. Moreover, the institutional entrepreneur needs to make sure that communication channels between them exist and are well-functioning: the institutional entrepreneur is the most important communication channel, even a mediator between

[152] Minatec is the name given to the newly funded Micro and Nano Technologies innovation centre. It constitutes the core of the new cluster.

them. Last, based on the case study, we argue that the mobilisation process is carried on primarily for and from the outside of the core of the project.

This chapter is designed in five main parts. First, as the review of literature on sequence and linearity of the mobilisation process is limited, insights from the sociology of science are used to hypothesize on the unfolding of the process. Methods and data collection present the case under study followed by the analysis section. Then, we discuss results before concluding with the limits and main implications of the study.

2 The Institutional Entrepreneur and the Mobilisation Process

Sequence, linearity and pace are ways to qualify the process of mobilisation in institutional change. If in situations of evolutionary change they may be difficult to quantify, situations of radical change, on the other hand, offer possibilities to isolate them. Moreover, by selecting cases in which agency is clearly identifiable in the instigation of change, we consider that tracking the mobilisation process is easier; steps in the mobilisation process could probably be traced back to conveners or partaking situations[153] (Dorado, 2005), but following leveraging is the most illuminating path because evolutionary changes seem less likely to occur in these situations. The work here is therefore limited to following strategies and actions of an institutional entrepreneur.

Sequence, linearity and pace are indicators to help better understand not only the mobilisation process, but they are also the result of the institutional arrangement. Lawrence et al. (2002) already pointed to the fact that the strategy followed by actors to mobilise support has a direct impact on the pace and the stability of the outcome of the transformation process. The focus of this paper is placed only on the emergence phase of institution building, which implies that the question of pace cannot be properly addressed as it would entail a longer scope for the study (nevertheless, we shall come back to it during the discussion). However, we can evaluate, to a certain extent, the stability[154] of the outcome as institutionalisation actually took place. Our efforts are devoted to the sequence of the mobilisation process and we consider that the linear (or not) characteristic of the process may also be encompassed within the analysis of its sequence.

Institutional entrepreneurs are interested agents who develop strategies to reach their goal based on resources available (DiMaggio, 1988). They play a central role in mobilising support and resources to achieve institutional change (Maguire et al. 2002). Resources needed may be tangible or intangible ones. Complementary resources are used and build on each other so as to sufficiently impact the institutional design. Money, manpower, and objects are easily hounded. Legitimacy is also an essential resource to be gained (Aldrich

[153] Dorado proposes three broad profiles of institutional change: convening, leveraging and partaking. Each is based on a triangulation of agency, resource mobilisation and organisational field characteristics.
[154] Stability of the transformation is one aim of the institutional entrepreneur: Chapter 2 refers to it as "making the new institution last".

and Fiol, 1994; Zimmerman and Zeitz, 2002; Scott, 1995). However, in the early phase of the mobilisation process, resources and supports acquired may not be visible and are therefore difficult to trace: they themselves result from the mobilisation effort, and the process by which they were mobilised is hidden. Ways to acquire them have been subject to a large amount of work from scholars (e.g. Durand and McGuire, 2005; Rao, 1994; Haveman and Rao, 1997), but the sequence of the process in itself stayed mostly unexplored due to the lack of continuity in following their traces. In reality, most of the case studies do deal with it more or less explicitly.

2.1 Sequence of the Mobilisation Process

Activities that take place during a mobilisation process occur in a sequence. In most studies, the process of mobilisation is rather chaotic, even when institutional change is radical. Thomas Edison, for example, whose story is recounted by Hargadon (2004), had to convince both engineers and scientists of the validity of his innovation (the electric bulb), but also the general public and public authorities needed to become accustomed to the fact that electricity would be an advantageous replacement to the existing lighting system. In this complex situation, following the sequence of the mobilisation process is not easy.

It is often implied that change is induced from within the organisation to the outside of it, from the centre to the periphery (e.g. DiMaggio, 1991). Actually, scholars acknowledge that each new venture faces different environmental conditions and forces (Zimmerman and Zeitz, 2002), and there is a generally shared agreement on the fact that the institutional entrepreneur will begin close to where he is, which reinforces the importance of his position in the institutional field, and will expand his action over time. The model presented by Aldrich and Fiol (1994) is geared towards this direction, and it is actually the only piece of work cited in the literature that has devoted some space to this issue. The two authors, working on the emergence of an industry, consider that the new venture should build enough legitimacy to finally reach the institutionalisation stage. Thus, entrepreneurs not only set up new firms and organisations, but through their renegotiation processes, also promote new institutions. They propose different different of "levels of social context" that can be interpreted as layers that an entrepreneur has to go through in order to convince actors to follow her/him in the emergence of a new industry up to its institutionalisation[155] of the new industry. These levels[156] are: organization, intra-industrial and inter-industrial. With this classification, the authors went beyond the simplistic internal (the company) / external (rest of the world) segmentation, as they characterised the external environment.

[155] Institutionalisation is here considered as the result from the mobilisation process. It results in the stabilisation of the new institutional design.

[156] Passage from one level to the next necessitates the creation of some sort of legitimacy (trust, credibility, and legitimacy, respectively)

This drives me to the first hypothesis to be tested:

Hypothesis 1: The mobilisation process is carried from the inside to the outside of the institutional entrepreneur's organisation.

2.2 Selection and Adaptation of the Actors to be Mobilised

However, most studies focus on transformations occurring within a single category of firms and therefore the whole process described by Aldrich and Fiol is never fully covered: studies analyse in an in-depth manner what happens at one level, organisational (ex: Zilber, 2002; Lawrence et al., 2002) or intra-industrial one (ex: Garud et al., 2002; Durand and McGuire, 2005) with glimpses of constraining elements or contexts. Their analysis reveals how new practices are adopted and how the population of organisations' characteristics have an impact on the adoption process.

The process of mobilisation, however, may be slightly different when dealing with structures that are not part of a single institutional field or part of a single group of organisations. Indeed, coordination (with the aim to organise change) is more difficult when the structure encompasses heterogenous actors. Mangematin et al. (2005) refer to Meyer's meta-level coordination structure, while it is also possible to consider the case of a network of heterogeneous actors, like a technoeconomic network[157] (Callon, 1991). We could gain many insights in relation to bringing in supports in a coalition by considering work done on networks in sociology of science and by adapting it to the object under study.

Considering networks as coordination mechanisms allows comparing the mobilisation process with the aim of creating a new institution, to network creation. Indeed, for Callon and Law (1988) or Callon (1991), setting a network entails defining identities for players that have been mobilised, incorporating them in visions of future worlds, etc. Institutionalisation of a vision also results, as an innovation[158], from a "long and costly transportation process made of successive investments, obstinate efforts and perilous translations"[159] (Callon, 1999). It can only occur when actors are aligned and the network is consolidated. This statement invites us to further probe the micro-processes of the mobilisation process, which shall highlight its sequence and linearity. Based on this consideration, two kinds of networks are successively mobilised in the following sections. Techno-economic networks and socio-technical network analysis offers us the possibility to add four more hypotheses to our research.

[157] "A coordinated set of heterogeneous activities which interact more or less successfully to develop, produce, distribute and diffuse methods for generating goods and services" (Callon, 1991 : 133).
[158] The comparaison (and complementarity) of innovation and institutional theory is analysed in depth in Hargrave and Van de Ven (2006).
[159] Author's own translation.

The term mobilisation, that we have been using so far, is refined based on this literature by the addition of the notions of interessement[160], enrolment[161] (Callon, 1991) and translation (Callon and Latour, 1981). Creating coherence within the heterogeneous set of actors who are approached duing the mobilisation phase is through the process of translation. In their early work, Callon and Latour defined it as : "negotiations, intrigues, calculations, acts of persuasion and violence, thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak or act on behalf of another actor or force" (1981:279). Translation implies displacing agents, organisations or institutions to order the network. It is giving an identity and a role to each of the agents through a series of programs (trajectories). In a network under construction, potential supports need to make sense (Weick, 1995) out of chaos; actors need to be interested, as in the process of institution creation. However, as they do not share the same vision of the world as the entrepreneur, it is difficult to anticipate the elements that could make them accept the "new vision". Each new translation of actors who joins the coalition therefore changes the project they were initially proposed to join. Overall, as the number of translation increases, so does the work of renegotiation that the entrepreneur undertakes. Therefore, each new actor (called 'C') joining the network should be considered as having done it only on a temporary basis, because the fact that another player (called 'D') gets translated (by 'A') may lead to a reconfiguration that does not fit 'C'. Alignment is therefore not forcibly reached even when all required actors have been interested. The enroller should ensure that the enrollment of a new type of actors does not lead to the dis-enrollment of another. Applying this approach to the mobilisation process that takes place during the emergence phase of institutional change leads us to the second hypothesis:

Hypothesis 2a: During the emergence phase of the mobilisation process, the institutional entrepreneur's work entails a series of iterations with the supports so that to provide adjustments as the network is evolving.

If in consolidated networks an actor may rationally anticipate which actions to undertake because visions of present and future worlds are known and shared, in emerging networks identities of players are unknown, as are their roles and the competences they should possess. This means that in uncertain situations, actors are selected based on the role they are expected to be able to play in a potential future. It is consistent with the discussion on the role of the institutional entrepreneur who might redefine identities in the process of institution creation (ex: Fligstein and Mara Drita, 1996). Therefore, the following statements completes hypothesis 2a:

[160] Interessement : comes from the French word *intéressement*. It is defined as a "set of actions used by an actor to impose him/herself and to stabilise other actors' identities which were defined during the problematisation phase". Author's own translation from Callon (1991).
[161] Enrolment is described as "a mechanism by which a role is defined and attributed to an actor who accepts it. It means a successful interessement." Author's own translation from Callon (1991)

Hypothesis 2b: During the emergence phase of the mobilisation process, the institutional entrepreneur needs to identify meaningful actors

Hypothesis 2c: When selected, the institutional entrepreneur attributes them a role linked to his vision of the future world.

2.3 Local and Global Networks in the Mobilisation Process

Callon and Law's (1988) notion of negotiation space as a link between global and local networks helps to enrich the picture of the mobilisation process. It particularly emphasises the intermingling of different levels of analysis and the difficulty to articulate, using their own terminology, local and global degrees. It thus comes as a strong complement to Aldrich and Fiol's proposal (1994). Recounting the failure of the TSR 2 project, Callon and Law distinguish three elements: a global network composed of the major actors who had to be mobilised to build the new aircraft; government; and industry players. The global network includes actors who oversee the project, but who are not involved in its day-to-day management, as the following quote illustrates:

> "A global network of actors had been built. For the time being the support of these actors could be assumed and the protagonists of the project could turn their attention to other matters. The character of this support is interesting. In effect, the actors in the global network had agreed (or so, at least, it appeared) to grant the project managers a degree of autonomy. Such actors would not concern themselves with the detailed development of the project, and neither would they interfere with its internal running. In return for offering financial support, they were seeking limited and specific returns: periodic accounts of progress and the assurance that, five or six years later, the TSR 2 would be in production and going into service with the RAF" (1988:289).

The first step of the mobilisation process was successful (at least on a temporary basis) and the project could move ahead, technically speaking. As engineers from two different companies were selected to design the new aircraft, negotiations needed to occur concerning technical specifications[162]. Callon and Law (1988) point to the need to create a negotiation space, which allows a local network to be set up. This space is designed to articulate global and local networks: on the one hand, there wass the willingness of governments and industrialists to issue a contract to design an aircraft answering to as many requirements as possible; on the other hand, there were two engineering teams who had to bring two different designs together. In between, project managers were offered autonomy to manage the project, i.e. the negotiation space. For Callon and Law, only if managers actually manage the negotiation space, by becoming an obligatory point of passage, could the project succeed. If they could not act in between the global and local

[162] As neither of the two companies had proposed a project that would perfectly fit within the government's needs, it was decided that the two companies, whose proposals partly fulfilled the British government's specifications, would work together and each bring elements to be incorporated into a newly designed aircraft.

networks, uncertainty and pressure would grow around the project, and stability within the global network[163] erode.

Applying this analysis of technical change to institutional change demands that the institutional entrepreneur differentiates a global network from a technical network. The institutional entrepreneur would also need to organise the equivalent of a negotiation space between the two. Fligstein and Mara-Drita's work on the creation of a single market in the EU (1996) can be interpreted from this perspective. They illustrate how Delors first mobilised players at the EU level, including the EU Council, France's President Mitterrand, and Germany's Chancellor Kohl. Fligstein and Mara Drita point to how "the commission was able to [work and achieve new institutional arrangement] by trading off the interests of important state and corporate actors" (1996:1). Said otherwise, a negotiation space was created which allowed technical and juridical staff (local network) to propose four types of harmonization to eventually apply to the Single Market Project.
The similarities between the TSR 2 case and SMP lead us to propose the third hypothesis[164]:

Hypothesis 3: Institutional entrepreneurs need to create different networks: a global one and a local one, the latter focusing on the day-to-day work.

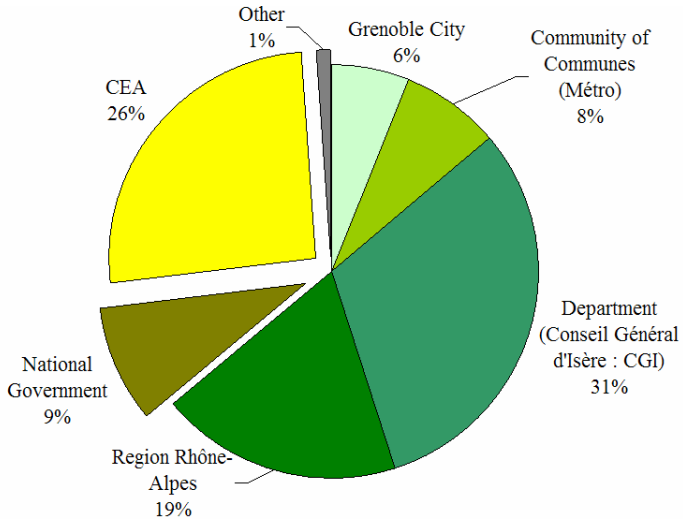
3 Case study

The focus of this study is a qualitative analysis based on the emergence of a new institution in which an institutional entrepreneur leveraged resources and support. We focus on a single type of institution creation process. The case study at hand is an excellent milieu in which to test our hypotheses for three reasons. First, the Grenoble cluster in micro and nanotechnologies is considered an institution in itself. Institutions are broadly defined as "humanly devised schemas, norms and regulations that enable and constrain the behaviour of social actors and make social life predictable and meaningful" (Hargrave and Van de Ven, 2006: 866). As illustrated in Chapter 1 of this thesis, rules, norms and schemas of the world have changed between the end of the nineties and 2005[165]. A successful institutionalisation process occurred which not only witnessed re-arrangement of its components and de-institutionalisation, but also new schemas and identities for the actors involved.

[163] Here Callon and Law speak of a sociotechnical network as they point to technical and human aspects of social networks. These aspects are not what we want to highlight here. We only want to enrich the mobilisation process behind institution creation based on their anaylsis.
[164] Note that this last hypothese may contradict Hypothesis 1, as global and local are different from inside/outside.
[165] The process of institution creation is said to have lasted from 1999 (conclusions from Léti-WG; Therme became head of Léti) to 2005 (the greater Grenoble area was granted the « pôle de compétitivité » label).

Second, the institutionalisation process permits to determine some equivalent to phases[166] punctuated by tests to validate the course of action. The period under study here only points to the first phase because it is the one which requires the most effort towards supporting mobilisation (everything has to be built; everyone has to be convinced). This period is determined as ranging until the first irreversibility of the process. The mobilisation process results from a series of translations, which aim at interesting an actor and enrolling her/him to support the project. Translations are by definition reversible but to "the extent to which it is subsequently impossible to go back to a point where the translation was only one amongst others; and the extent to which it shapes and determines subsequent translations" (Callon, 1991: 150). So when the first irreversibility occurs, the early time of the mobilisation effort is considered finished. However, this is not to say that the global process is finished. The signing of the agreement of understanding, which funded the building of Minatec, is considered the first major irreversibility because it engages in a definite manner the signers. The building was worth 150 million Euros, of which the greatest part was funded by local authorities (Figure 1).

Figure1 Minatec Sources of Funding



Note: Grenoble City, the Community of Communes (Métro), Isere Council (CGI) and Rhone Alpes Council are local public authorities. The funding process results from a vote of all elected councellors (in none of these was there a single vote against the project – despite abstentions)

Third, the mobilisation of support and resources is under scrutiny in the case study realised by an institutional entrepreneur. Jean Therme, then head of CEA-Leti[167], aligned heterogeneous public and private actors in order to create a new institution. A series of interviews with key members on site pointed to the specific role J.Therme played: all

[166] Cf. Chapter 4 in this thesis
[167] CEA-Léti is CEA's electronics laboratory. It is at the core of the newly funded MiNaTec. CEA is the French Nuclear Energy Agency. CEA possesses three main centres in France. One of them is located in Grenoble.

described him as the one who achieved this result. The absence of debate about the "father" of Minatec is significantly unusual, and should be noted.

4 Data Collection and Analysis

4.1 The story in a nutshell

We start here with a brief description of the genesis of Minatec, before going into detail about the data that was collected. Minatec, as a project, started in November 1999. The idea resulted from two single projects brought together by Jean Therme, at the time, head of Léti laboratory. On one level, two engineering schools decided to move closer to research laboratories that had the same research interests. On another level, there was the ZHT[168] project which aimed at setting up a high technology area to support start-up development. This latter project was sponsored by the city of Grenoble and CEA-Grenoble. Started in 1997, the project stagnated in 1999 as local public authorities and CEA were still fighting over technical details such as the physical boundaries of the field on which the ZHT would be located, the types of companies that would be allowed to settle down, the designation of the owners of the buildings, or actors who would be in charge of the management of the site. So, as Gaubert[169], Vice–President of INPG, argues: "there was our project on this side; and ZHT project on the other side. J.Therme came and "BANG", Minatec was born!"

4.2 Data collection

Looking at phenomena retrospectively, any research faces the danger of rationalization from the actors, which would deeply weaken the analysis, as the purpose here is to unveil the institutional entrepreneur's day-to-day activities. Not being on site at the time of the emergence written traces are crucial. We collected such elements, which together enable to test our hypotheses.

First, we were able to reconstruct J.Therme's timetable during the three years of the emergence phase. For that matter, his agendas were collected and all elements (meetings) that dealt with Minatec at large were identified[170]. Therefore, it is feasible to follow whom J.Therme met and what the reasons for these meetings were.

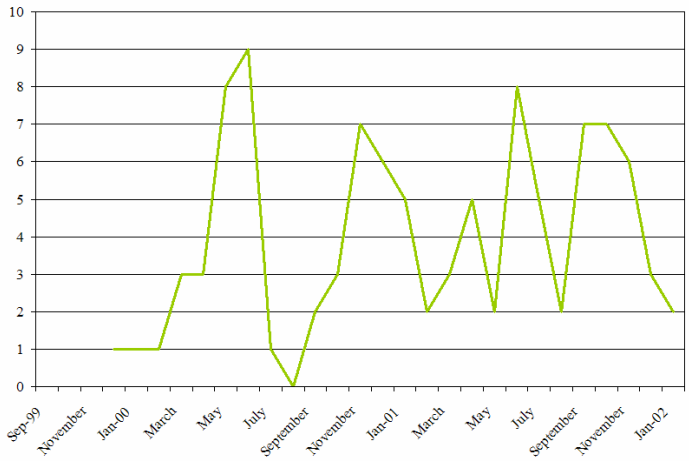
[168] Zone de Hautes Technologies.

[169] Interview with Claude Gaubert, February 2004. INPG is a consortium of nine engineering schools located in Grenoble. Two of them joined CEA to create MiNaTec.

[170] A period of three months is blank in the agenda. It corresponds to Therme's entry as head of CEA. As such, Therme was, at the time, dealing with many day-to-day management issues which had nothing to do with MiNaTec. His assistants confirmed it. Before 2001, Therme was head of CEA-Léti laboratory (1999-2001), one of CEA Grenoble laboratories. CEA-Léti is at the core of MiNaTec as its research deals with microelectronics and Microsystems.

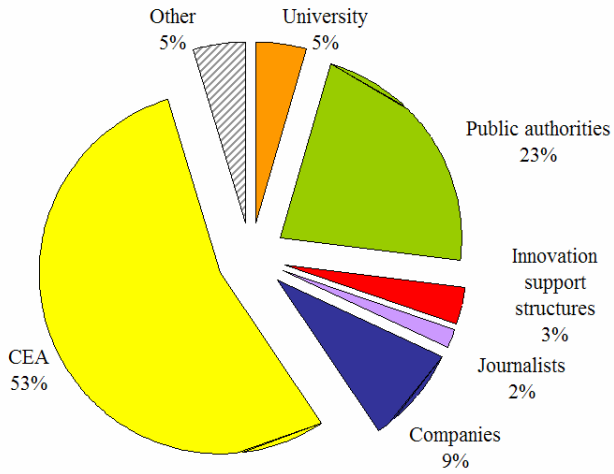
Moreover, a second source of information comes to enrich the construction of the support network: the PowerPoint™ presentations that J.Therme used as a tool to mobilise support and resources. 102 presentations were made between December 1999 and January 18th, 2002. Figure 2 clearly illustrates variations in the mobilisation process.

Figure 2 Repartition of PowerPoint™ Presentations Over the Selected Period



The number of persons attending the presentations varied from 3 to several dozens. It was then necessary to identify the position and organization of each of the 955 persons identified. Figure 3 presents the distribution of attendees in broad organizational and institutional categories, while Table 1 brings geographical distinction within the main categories (CEA, public authorities and other).

Figure 3 Distribution of Attendees by Broad Categories (All Presentations)



The count here captures the total attendance for the 102 PowerPoint™ presentations; it means that if a person joined two presentations, he/she is counted twice.

Table 1 Geographical Distribution of Attendees

Geographical level	CEA	Public authorities	Other
Local	78.8%	56.7%	61.6%
National	21.2%	32.8%	32.9%
European / World	n/a	10.5%	5.5%

- A Discourse structured around 5 themes

As the quantity of information to be taken into account was very large (102 PowerPoint™ presentations, each composed of more than 30 slides on average), a software assistant was considered. Alceste® co-word analysis software was selected to support the analysis of the 760 basic slides[171] that are used as a library to design each of the 102 PowerPoint™ presentations. Alceste®'s basic principle is to group words together that often appear in the same unit of analysis; the basic unit of analysis here is a sentence within a slide. An extract of Alceste® report is included in Appendix 1 as an example. Clusters of words are designated by the software based on the number of co-occurrences of words: five clusters resulted from this analysis. Within each cluster, differences exist between words: some are more important than others. Criteria to characterise words and determine "core words" include:

- The number of occurrences of each word (throughout the 760 slides and within a specific class): a distinction needs to be made between the number of appearances of a word among the total population of slides, and the number of appearances of a word exclusively with words associated to the same cluster.
- Its position within the cluster (measured by the Chi² value): the higher the Chi² value, the most central to the cluster the word is.

Table 2 Characterisation of Words Within a Cluster

		Word 'X' position compared to the core of cluster "N"	
		Word 'X''s chi² > average of chi² of cluster N	Word 'X''s chi² < average of chi² of cluster N
Relative presence of word 'X' in Cluster 'N'	> 80%	Central/specific	Peripheral/ specific
	< 80%	Central/generic	Peripheral / generic

By considering these two elements, "core words" (characterised as central/specific in Table 2) are determined. They are the basis in naming the cluster of words to which they belong. Other types of words, especially peripheral/specific ones and central/generic ones, come to refine the definition of the cluster up to the determination of a central theme. The

[171] The 102 presentations are made of 3360 slides but actually, there are "only" 760 different slides i.e. they have the same body of text. Thus the uniqueness of a slide is determined not by the "title + body of text" couple but only by the body of text. Indeed, titles are used to increase the fluidity of the presentation and can vary based on the re-arrangement of slides within a specific presentation. The 102 presentations are a re-arranegment of the 760 basic slides.

same work is realised for each of the five clusters and the analysis leads to the following definition of clusters (themes):

- Cluster 1: Minatec position compared to other national or European clusters;
- Cluster 2: Definition of Minatec 'institution-to-be' concept;
- Cluster 3: Scientific and technological scope of actors to be involved in Minatec;
- Cluster 4: Technical and financial concerns about the construction of Minatec (incl. Business plan.);
- Cluster 5: Position of Minatec vis-à-vis the CEA institution.

The analysis report also points to specific slides that are affected by clusters[172]. This tag added to slides allows the identification of themes in each presentation by assigning each slide to the presentations it belongs to. Therefore, presentations can be characterized by the relative importance (weight) of each theme. This permits to follow the sequence of themes over time. Slides unaffected by a cluster are attributed to an "x" cluster[173]. A factorial analysis, ran on the weight of themes in each presentation, allowed to establish profiles of presentations. The PCA function was selected, as raw data are already "normalised" because they represent relative weights (see Appendix 2 for the report). Results are proposed based on graphic illustrations provided by the ACE® tool. Figures 4 and 5 are used to illustrate the diversity of the PowerPoint™ presentations.

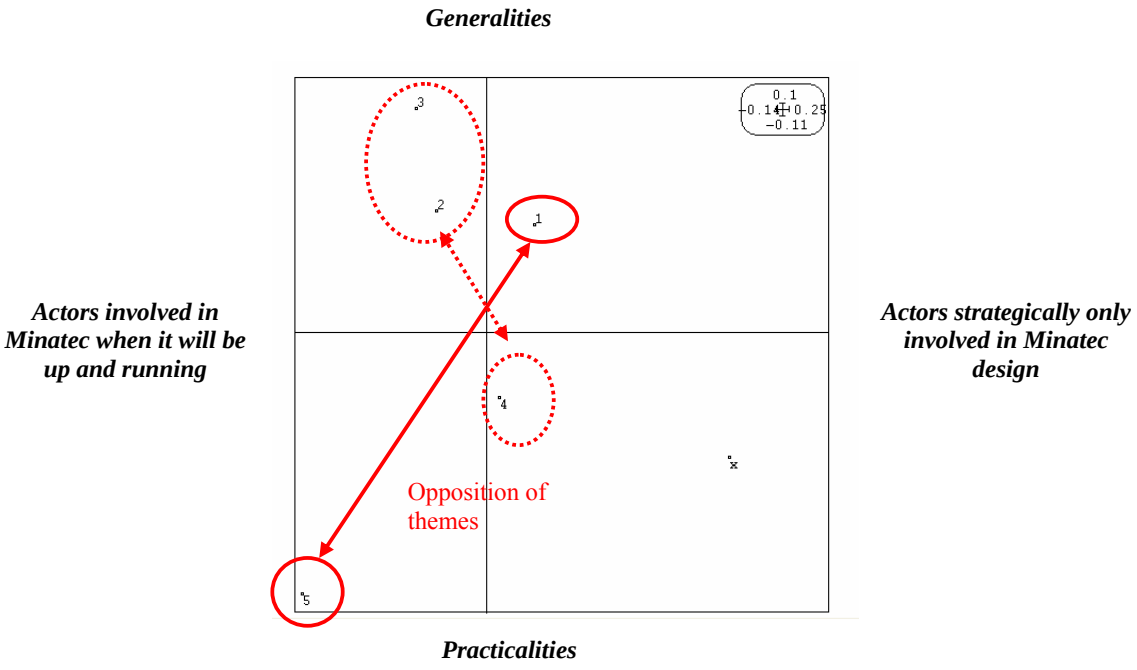
- Strong thematic differences between presentations

What is striking in Figures 4a and 4b (and summarized in Table 3a and 3b) is the opposition of the profile of PowerPoint™ presentations in relation to the themes[174]. This means that themes are associated very differently in the global population of presentations. Based on the analysis, themes are associated differently depending on:

- The closeness of audiences to the strategic design of the project (vs. its practical implementation);
- The degree of the audiences involvement in Minatec as an innovation center (scientists and engineers vs. public authorities and others);
- Whether or not audiences belong to CEA Grenoble's core partners;
- Audience geographical location (Grenoble vs. others).

[172] These slides are composed of words that made up the core of a cluster.
[173] Cluster x slides are not uninteresting slides: they can translate the specificities that need to be introduced to personalised presentations. Cluster x slides may appear several times. Only, they are not devoted specifically to any of the five themes. A second analysis was run to be sure that a smaller theme was not present within this category of slides and which could not be detected in the larger analysis.
[174] Numbers (1,2,3,4,5,x) refer to classes determined based on Alceste®.

Figure 4a Visual representation of how themes are associated in presentations (axes 1 and 2[175])



Globally, presentations that concentrate on Theme 1 do deal with Theme 5; presentations that have a high proportion of Theme 3 slides usually also have a large proportion of Theme 2 slides but few Theme 4 slides. Figure 4a opposes the association of themes based on 2 axes:

- *The vertical axis opposes the generalities of Minatec (Themes 1, 2 and 3) to the practicalities of realising Minatec(Themes 4, 5, x);*
- *The horizontal axis opposes those who will be involved in Minatec when it is up and running (Themes 2, 3, 5) to those who are only strategically involved in Minatec (Themes 1, 4, x).*

This segmentation summarized in Table 3a clearly points to themes devoted to different audiences depending on the amount of participation in the project (attachment to S&T concepts or to strategic elements).

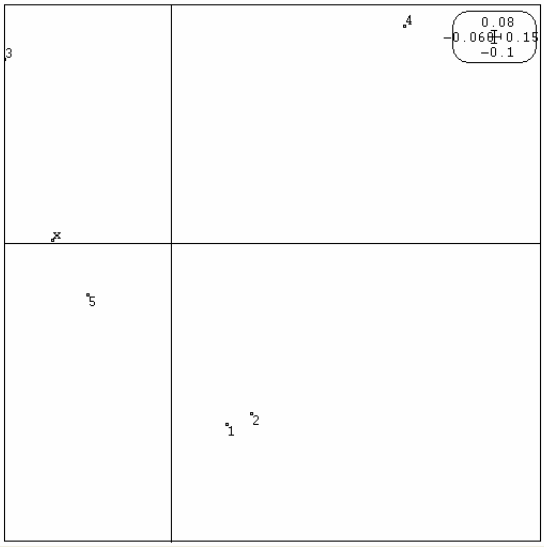
Table 3a Summary of Figure 4a quadrants based on the interpretation of axes 1 and 2

Minatec generalities / themes that concern actors who could work in Minatec	Minatec generalities / themes that concern actors strategically involved in Minatec
Minatec practicalities / themes that concern actors who could work in Minatec	Minatec practicalities / themes that concern actors strategically involved in Minatec

[175] 95% of the theme/presentation relationship is explained using 4 axes. Figures here are used as a support to hypothesis validation only.

Figure 4b Visual representation of how Themes are associated in presentations (axes 3 and 4)

External

CEA 

Others

Local supports

Figure 4b adds two elements to be considered which oppose the association of themes:

- The vertical axis opposes themes aimed at gaining specific support outside the core of the project leaders (S&T and financial elements – Themes 3 and 4) to themes aimed at gaining local support (Themes 1, 2 and 5). It is essentially a geographical segmentation;

- The horizontal axis opposes exclusively CEA-Grenoble (and its relation to its industrial and organisational partners (Themes 3 and 5) to others (Themes 1, 2 and 4).

This segmentation, summarized in Table 3b, points to themes this time, depending on the geographical location of the audience.

Table 3 b Summary of Figure 4b quadrants based on the interpretation of axes 3 and 4

Not local and more specific support looked for / CEA-Grenoble and its close partners	Not local and more specific support looked for / Other than CEA closely related
Local generic support / CEA-Grenoble and its close partners	Local generic support / Other than CEA closely related

- Strong thematic differences over time even within a single audience type

Most interesting is to follow the evolution of themes over time. As a single figure encompassing all presentations would be unreadable, we chose to select a few cases based on audiences. These have not been selected randomly. They encompass the categories of actors where the most involved in Minatec funding: CEA management and local public authorities.

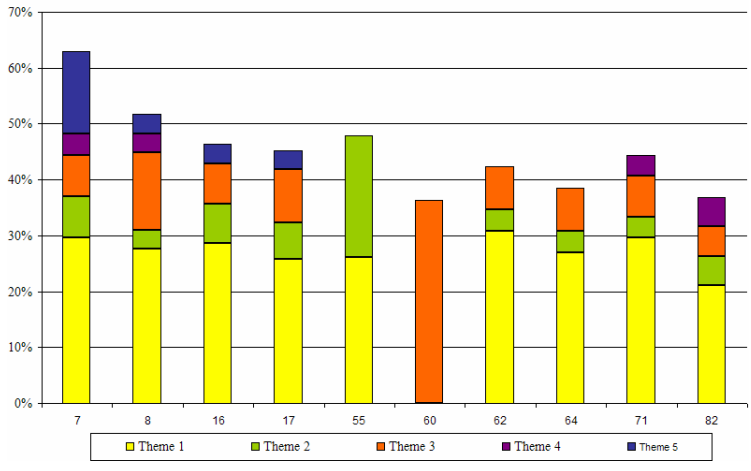
Figures 5 and 6 illustrate the evolution of themes based on the geographical/institutional affiliation of audiences: for local public authorities (Figures 5a and b) and for national level CEA management staff (Figures 6a and b). These are only two examples: such patterns are found in other situations.

Based on the analysis, themes are differently associated within presentation overtime based on:

- The audience (CEA vs. others);
- The involvement in the Minatec set-up (generic involvement to support the project vs. financial and practical details of the project);
- The validation of the project (2 CEA internal decisions and the series of public authority votes from May to July 2001)

- **Type of Audience 1** : "Local Public Authorities" (Grenoble City – Grenoble Communities of Communes"Métro" – Isère Department – Rhône-Alpes Region)

Figure 5a Representation of the evolution of themes for all the local public authorities' designed presentations



- *Theme 1: Minatec position compared to other national or European clusters;*
- *Theme 2: Definition of Minatec 'institution-to-be' concept;*
- *Theme 3: Scientific and technological scope of actors to be involved in Minatec;*
- *Theme 4: Technical and financial concerns*
- *Theme 5: Position of Minatec vis-à-vis the CEA institution.*

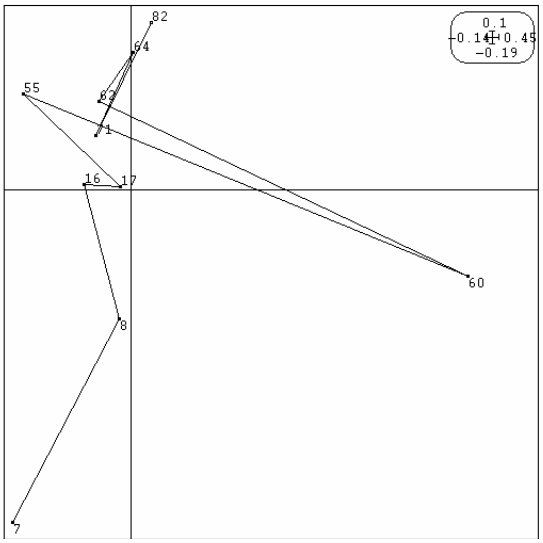
Figure 5a shows thematic differences between the presentations prepared for local public authorities. It points to the turning point that presentation 60 represents: it is clearly different to the others. Moreover, Theme 5 (Position of Minatec vis-à-vis the CEA institution) is present originally and disappears over time.

A statistical analysis was run to complement this firts description.

Figure 5 b Statistical analysis illustrating the evolution of themes over time for presentations designed to"local public authorities" (Grenoble City – Grenoble Communities of Communes"Métro" – Isère Department – Rhône-Alpes Region)

Technical partners

Generic concerns



Technical and financial concerns

Other

Two axes explain the distribution of presentations (86% of the phenomenon):

- The horizontal axis opposes public authorities who are technical partners (effective design of the project) to public authorities who are not directly involved in the technical making of the project but whose support is nevertheless required.

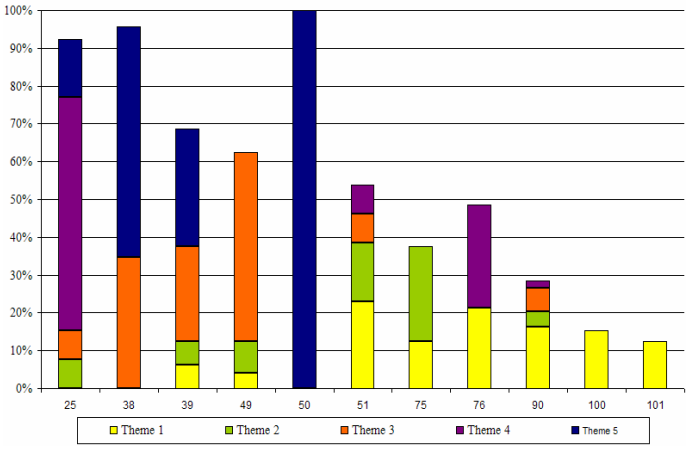
- The vertical axis basically opposes presentation 60 to the other ones. It is the only one dealing exclusively with "Theme 4" slides and it is also the presentation that has the largest presentation of "x" slides .

Figure 5a brings more detail to the vertical opposition. The justification lies in the fact that presentation 55 brought together all public authority representatives as well as CEA national ones who agreed on the continuation of the project (this is why Themes 1 and 2 that position the project in broader national perspectives dominate). Following this first agreement, practical details and technical matters were tackled during presentation 60.

- **Type of Audience 2**: CEA National Managing Committees" (Direction de la Recherche Technologique, DRT; General Assembly, AG and General manager, AGA)

The same approach as for "local public authorities" is used.

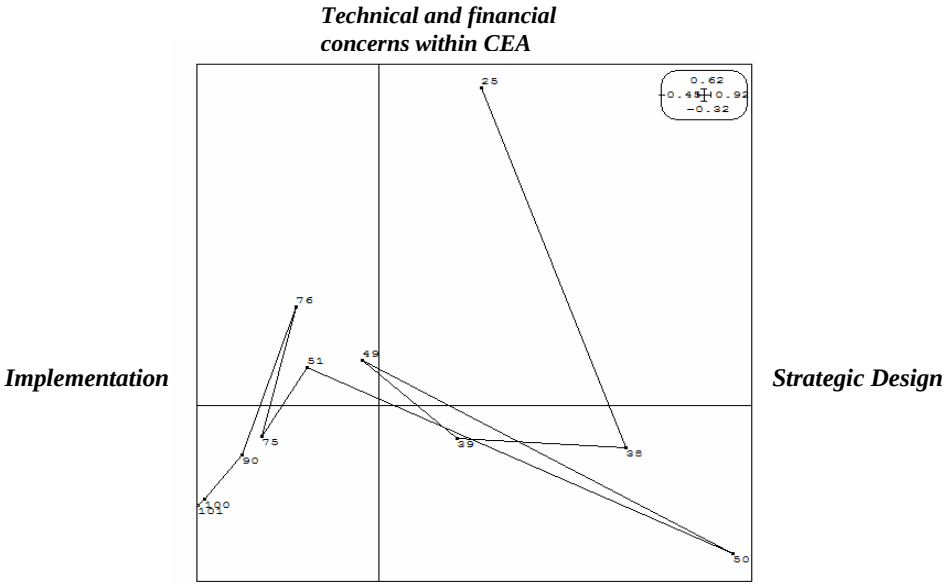
Figure 6 a Representation of the evolution of themes for"CEA national managing committees' designed presentations



- *Theme 1: Minatec position compared to other national or European clusters;*
- *Theme 2: Definition of Minatec 'institution-to-be' concept;*
- *Theme 3: Scientific and technological scope of actors to be involved in Minatec;*
- *Theme 4: Technical and financial concerns*
- *Theme 5: Position of Minatec vis-à-vis the CEA institution.*

The pattern of themes within presentations is even more striking than in the past example. Presentation 50 clearly shows a turning point (which enables to understand the occurrence of the two key presentations - 55 and 60 in Figure 5a)

Figure 6b Statistical analysis illustrating the evolution of themes over time for presentations designed to "CEA National Managing Committees" (Direction de la Recherche Technologique, DRT; CEA General Manager, AG and CEA Deputy General Manager, AGA)



Two axes to explain the distribution of presentations over time (they explain 84% of the phenomenon):

> *- The vertical axis basically opposes technical presentations (financially speaking or the reorganization of CEA-Grenoble) to more general presentations on the evolution of Léti which is illustrated in Figure 4a by a high proportion of Themes 4 and 5 on the right side of the chart and a high proportion of "x"theme presentations on the left side of the chart. Early presentations are preferably located on the right-hand side of the chart;*
> *- The horizontal axis opposes generic presentation about the organisation and its evolution to targeted presentations on the implementation of the change.*

- A Slide Structure that Points to the Intensity of the Mobilisation

The 102 PowerPoint™ presentations are essentially re-arrangements of 760 basic slides. Each slide can be characterised based on its first occurrence (birth) (Figure 7) and its last occurrence (death). It is said that "Slides have a life". Sometimes, slides have "a second life": they merged with other ones, giving birth to new slides (Figure 8). A combined slide results from the complete or partial fusion of two existing slides.

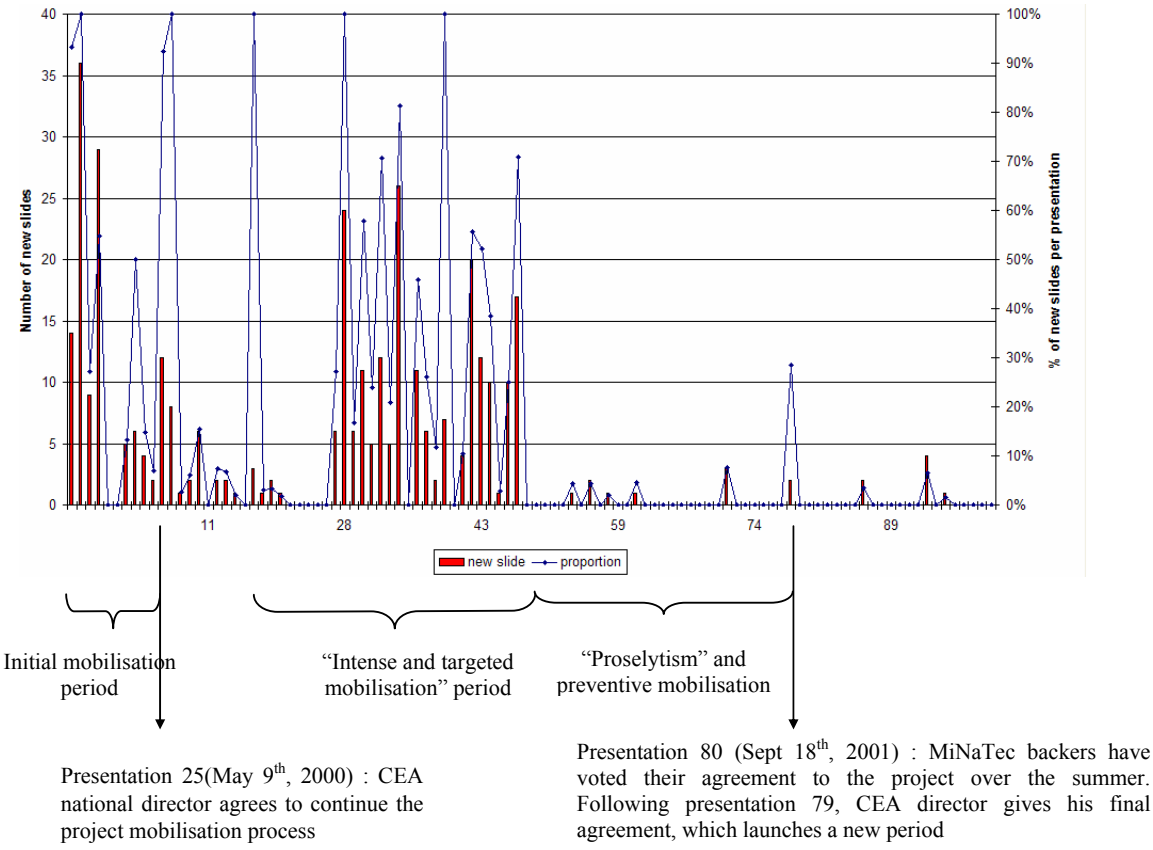
Focusing on the high rate of birth of slides gives us insight into the mobilisation process. Figure 7 highlights three periods. There are two periods in which presentations show a high rate of new slides. The first one is explained because it is the beginning of the mobilisation process. Therefore, J.Therme needed to establish his library of slides. Targeted audiences were mostly potential financial backers (Figure 1). J.Therme needed to convince first heads of the organisations (INPG and CEA) and of the local councils (Métro, CGI and CR). This period was crucial: the status of the project evolved from a single organisation (CEA) to a bi-lateral collaboration (CEA and INPG) to a larger one (with local public authorities). The second period of new slide fabrication, which goes from presentation 27 to presentation 49, is justified by the need to enlarge the initial mobilisation base. It was justified by the fact that the final decision to fund the project was subject to a collective vote[176] rather than to the agreement of the head of the three councils. The mobilisation requested to reach as many councellors as possible. Ministries at the national level or members of the European Commission were also approached during this period. New slides are designed to fit the various audiences' needs. We shall refer to this period as "intense and targeted mobilisation" one.

The most remarkable example of the complementarity of the different levels of actions (action towards the heads of the Councils and simultaneously to the members of these Councils (several dozens)) stands in the failure to reach an agreement at the CGI level in 2000; election occurred in the spring 2001 changing the composition of the council: to avoid the past difficulties to reach a consensus, J.Therme targeted specifically the head of

[176] Schedule of local councils votes:
June 8th, 2001: The head of the Rhône-Alpes Regional Council confirms the financial support by the region to the project.
July 9th, 2001: plenary session at Grenoble City Council : vote (unanimity with 4 abstentions)
July 13th, 2001: plenary session at the Isère General Council: vote (unanimity without any abstention). CGI agrees moreover to be the owner (*Maîtrise d'Ouvrage)* of the real estate operation.
July 13th, 2001: Community of Communes Council: vote (unanimity with 4 abstentions)

the new assembly, the councellors and as many local elected actors as possible. His strategy is that none should ignore what is Minatec. In the light of the 2000 failure, this strategy is interpreted as a preventive one.

Figure 7 Birth of new slides over time

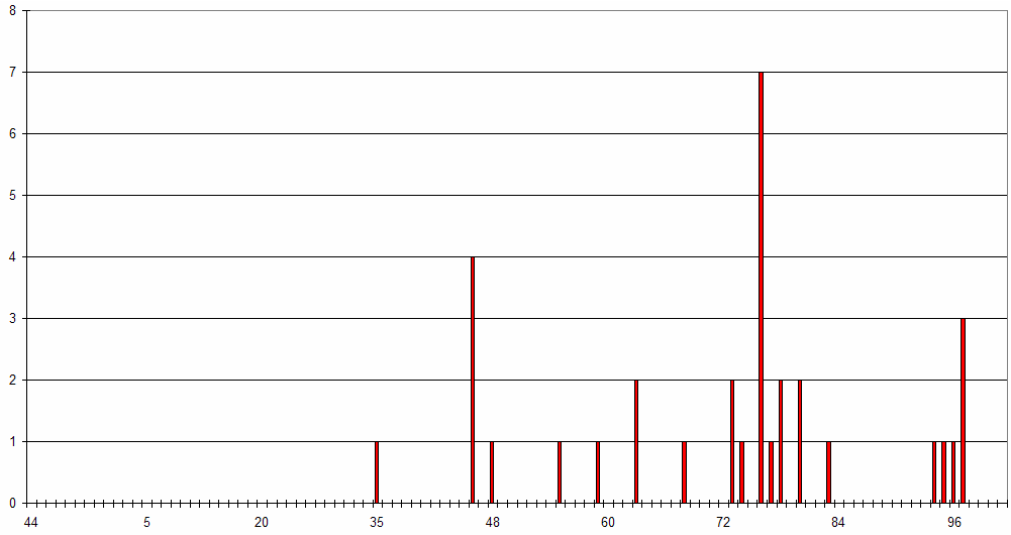


- A Slide Structure that Points to the Evolution of the Mobilisation Building

We complete this analysis with a closer look at the appearance of combined slides (Figure 8): they appear when an issue is no longer subject to discussion / controversies, or said otherwise when there is no need to spend a full slide on a single issue. The increase in slide combinations may be interpreted as the sign of stabilisation in the mobilisation process, or at least the sign of a new mobilisation phase[177].

[177] There are two ways to interpret the births of combined slides:
1. Combined slides occured after a decision has been taken. To determine that decisive moment requires locating the last individual use of the two original slides;
2. Combined slide also appeared when J.Therme anticipated the agreement.
But both situations exist and interviews were needed to point to the right case.

Figure 8 Birth of "combined slides" over time



5 Results and Discussion

Hypothesis 2a states that the institutional entrepreneur's work entails a series of iterations with the actors to provide adjustements as the network evolves. **Support for this hypothesis is found in the data.** Indeed, Figures 5 and 6 show that for a same category of audience, theme weights vary over time. They give an idea about how themes evolve globally over each presentation. They illustrate the different distribution of themes for each presentation over time for the two examples selected. That is to say that over time the institutional entrepreneur adapts his discourse to recurring audiences to ensure that their interests still fit within the evolving network. The most recurring audiences are public authorities (local and national ones who fund Minatec), and CEA management, both locally (Comet) and at the national level (AG, AGA and DRT).

They are nevertheless part of different networks and are mobilised at different moments. The introduction of new slides in a presentation is considered an indicator of "something [that] is happening or has just happened", an indicator that new potential members of the coalition are being approached. New slides, for example, can translate the appearance of a new theme or the need to customize the presentation for a certain type of audience. By linking this indicator to the audience of the presentation, three periods came about, with transitional periods:

- Period 1: January 2000 - mid June 2000: **Presentation of Minatec to the main partners with the aim of bringing in supporters and determining the feasibility of the project (**INPG – CEA steering committee – PMT Léti – Local

public authorities: Isère Department Council (CGI), Rhône-Alpes Region Council (CR), and City of Grenoble). The project evolves from a CEA project to a collective one.

- Period 2: Mid-June 2000 - September 2001: **Increase in the scope and scale of mobilisation** (intense, targeted and preventive mobilisation) The mobilisation effort is particularly important until the different local authorities voted their support (June/July 2001). Within this period, two kinds of support are approached:
  - First, presentations aimed at supporters who do not bring funds but who can influence the supporters' decision (Presentations 28-29-31-33-35-37-45) because (1) of their position and own legitimacy, like the French Education and Research Ministry or European Commissioners or because (2) of their links with potential backers like mayors of small cities close to Grenoble who can put pressure on the Department and the Regional Councils;
  - Second, presentations targeted a wider range of actors: members of the microelectronics industry, specialists of innovation and technological transfer, journalists, CEA retirees and new staff, INPG and ENS students, etc.

Simultaneously, partners mobilised in Period 1 act to further specify technical elements of the project : (1) Contracts establishing the financial and administrative constituencies of Minatec were established with the main supports; (2) CEA Grenoble's activities were starting to be re-organised (presentations 38 and 43 particularly) which explains the increase in the new-slide rate of birth: the organisation of CEA-Grenoble was in its initial phase around Minatec three core programmes (biotechnologies, sources of energy and telecommunications), which are in a design phase (presentation 45 and 50 illustrate this).

This second period officially ends with the agreement of local authorities to fund the project (voted in July 2001) and the visit of the CEA General Director (September 18th, 2001, presentation 75).

- Period 3: September, 18th 2001 - January, 18th 2002: Implementation of the project. Three activities are occuring:
  - CEA juridical staff finalised the design of the project along with local public authorities which resulted in the writing of the "Minatec Agreement of Understanding"(13 drafts of it were produced);
  - Internal re-organisation of CEA;
  - Communication about Minatec programmes and consultation with S&T partners (examples include: presentation 84 to ST Microelectronics Crolles, Michelin, Applied Materials, France Télécom research centre; presentation 80 to CSEM research centre; presentation 91 to IMEP microelectronics training centre).

This segmentation of the mobilisation process in three phases highlights the diverse networks that are taking shape: the first period exemplifies the development of a global

network made up of actors who globally delineate the boundaries of the project. In Law and Callon's example, they were industrialists who proposed projects and government officials who agreed to fund one project; here, they are local public authorities who fund Minatec building, and CEA representatives (at the national level) who agreed to let the project move forward linking their final agreement to the performance of the mobilisation process. Actors within this network are identifiable based on a convergence of insights from the birth of new slides (Figure 7) and from the appearance of combined slides (Figure 8). As previously said, it is possible to determine where decisions took place (and therefore who the members of the global network are) based on the last appearance of individual slides.

The third period illustrates the struggle of the local network as juridical and technical elements[178] are fought for. J.Therme was the link between both networks, presenting the evolution of the project to the global network while keeping track of changes with actors of the local network. He played the role of the obligatory point of passage that managers failed to accomplish in the TSR 2 case.

The second period sees the overlap of the two network elements and therefore comes as a transition period. Interestingly enough, it also witnesses the mobilisation of a larger audience who is not directly involved in the project (European commissioners, general public, microelectronics industries, French ministries). Their inclusion in the process is important because they are the ones who might put pressure on the project. In Law and Callon's example, one can interpret that the pressure put on the global network (essentially) by the greater project environment was responsible for the failure of the project.

These elements support Hypothesis 3. An institutional entrepreneur needs to build two networks: a global one and a local one. To bring them together, the institutional entrepreneur has to navigate between the two and needs to create the equivalent of a negotiation space. Moreover, as the global network is subject to uncontrollable environmental pressures, the institutional entrepreneur should ensure the mobilisation of heterogeneous actors who are not located in the original two networks. This argument resonates with J.Therme's action to inform journalists, old[179] and new CEA Grenoble staff and the general Grenoblois public. His aim was to ensure their support, or at least to avoid their resistance by including them in the emergence process. His communication strategy, that we call a preventive one also aimed at reducing uncertainty and environmental pressures. We can also consider it as "proselytism". The "proselytic" strategy is explained by J.Therme as follows: he presented his project to most mayors and city counsellors from the greater Grenoble area, even from villages. During interviews, he argued that when

[178] Including issues such as: Who will manage the new site? Who should possess the buildings? Who should be in charge of the construction (*Maîtrise d'ouvrage*)? What juridical status should the management of the building have? Where should the fence be located?

[179] CEA-Grenoble is a large job provider in the region. A large number of employees spent their entire career at CEA-Grenoble and many of the retirees are very attached to the organisation. CEA staff is considered member of the same large family. Various clubs (cultural, sports, even retirement staff) exist.

public authorities would have to vote the funding agreement, mayors and city counsellors from the greater Grenoble area would constitute a strong support for Minatec; public authority members who would vote would have to agree to the project as so many mayors and city counsellors supported it. In our discussion, this also comes as an anticipation strategy from the institutional entrepreneur to deal with potential environment pressures. The project almost failed as local elections came to change the political majority at the regional level: members of the global network changed and may have put pressure on the project. Only by taking care of the greater project environment with his "proselytic" strategy was J.Therme able to avoid the collapse of the negotiation space and the collapse of the project in general.

In light of these results, **Hypothesis 1 is rejected**. Indeed actors of the global network do not need to be from the institutional entrepreneur's own organisation or industry. It points to the limits of current works in relation to institutional change that focus on a single level of analysis. Aldrich and Fiol (1994) make an effort to cross levels and provide a larger picture of the emergence process of a new industry. However, they provide a linear[180] portrait of the process while the present case study emphasises iterations further. The case study invites us to reconsider the audience categorisation (Figure 9): members of the global network are part of the project but may come from different organisations; they are interested by the performance of the project and not by its technical aspects. On the other hand, members of the local network are deeply involved in the technical aspects of the project[181] but do not possess any power over its course of action. Last are members of the greater project environment who are both external to the project and external to its realisation. But as stated previously, it does not mean that they do not have any power over the project via their impact on the global network's members. The audience categorisation proposed is thus the following: project levels (local networks), institutions (global networks) and wider environments. Figure 10 illustrates the circulation of Jean Therme between the three categories.

The sequence of the mobilisation effort can therefore be seen from a different but complementary perspective to Aldrich and Fiol's. The advantage of the present categorisation is that it allows us to encompass different geographical, institutional, organisational and cognitive audiences. This classification also points to the roles that actors mobilised by the institutional entrepreneur take. Indeed, accepting to support directly or indirectly J.Therme's proposal means to accept a role; a role that is assigned by the institutional entrepreneur based on his scenario of the future. Actors within the project's greater environment are for this matter interesting: their mobilisation reflects the institutional entrepreneur's vision of the world. Indeed, they are approached depending on their position in an envisioned world and their abilities to reduce uncertainty and pressures during the unfolding of the project. For example, J.Therme proposed the project to European Commissioners (presentations 11 and 31), to members of the French Parliament

180 The three levels are organisational, intra-industrial and inter–industrial, up to the institutionalisation of the new industry.
181 Allocation of funds, definition of *maitrise d'ouvrage*, juridical procedures etc.

(presentations 10, 13 and 94) or to former directors of Léti (presentation 40): they are neither part of the global network nor of the local one. They belong to the project's greater environment and are attributed the role of warrantors by J.Therme, exactly as singers or movie stars are called upon to support a humanitarian campaign. They are selected for the personal legitimacy they bring to the project (Suchman, 1995). By taking on the role given/offered to them by J.Therme, they "sign" their enrollment to J.Therme's project. **This statement invites us to accept Hypotheses 2b and 2c**: during the emergence phase of the mobilisation process, the institutional entrepreneur needs to identify and select meaningful actors and attribute a role to them depending on the vision of the world he expects will unfold.

Figure 9 *Classification of actors in the mobilisation process.*

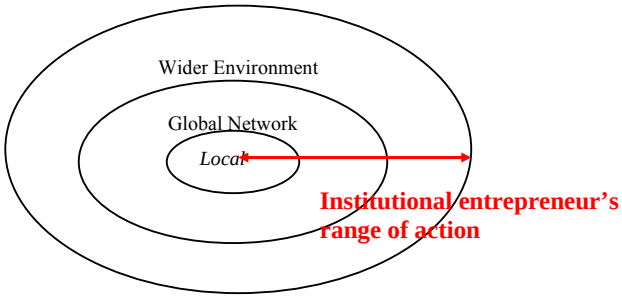
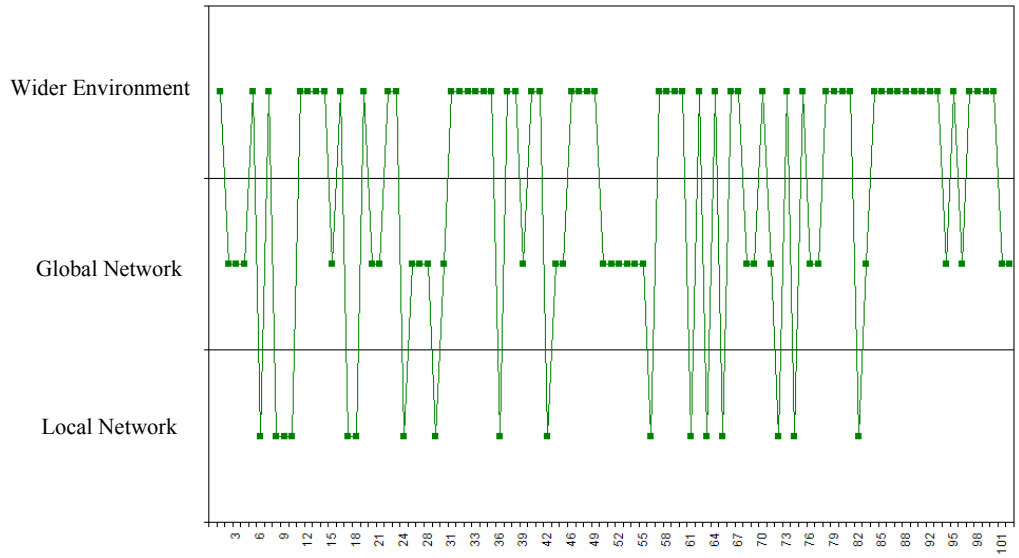


Figure 10 *Actions of the institutional entrepreneur across networks and the wider environment.*



Hypothesis 2c also implies that the selection process reflects the institutional entrepreneur's expectations of future worlds. Again, it is on the wider environment area (Figures 9 and 10) that we shall focus. In the second period of the mobilisation process, the range of potential actants (Callon, 1991) is extended to potential Minatec partners and players - industrials (Motorola, presentation 84; ST Microelectronics, Michelin, Applied Materials, FT, Crolles, presentation 28), training organisms (IMEP: presentation 91), other research centres (e.g. CSEM: presentation 80) and organisations supporting innovation (Assisses de l'innovation: presentation 33). Besides the legitimacy that they may bring, these actions of mobilisation aim at preparing the future and illustrate J.Therme's vision: Minatec shall welcome both start-up and large players and be open to setting up collaborations with these as well as with other research centres. **Hypotheses 2c is thus fully validated**.

6 Key Findings and Implications[182]

As with Amis et al. (2004) whose works has focused on an understudied area of organisational change, this chapter attempts to contribute to a better understanding of the institutional change phenomenon and more specifically, of cases in which multiple levels of analysis are included. If sequence and linearity are often implicit in case studies, the fact that they focus on a single level of analysis prevents the opportunity of exploring the subject. On the contrary, when multi-level dimensions are included, such as in the case under study, the pertinence of the issue is raised.

Only Aldrich and Fiol (1994) strive to explore the temporality of a new industry until its institutionalisation is taken as anchorage to legitimacy-building issues. The entrepreneur needs to cross different worlds/levels; in each, a specific component of legitimacy is built and allows passage to the next level. In contrast, our findings suggest that the mobilisation process is neither linear nor sequential: it is made up of iterations and reaches different levels simultaneously. At least this is what a statistical analysis combining themes of the presentations and affiliation of the audience leads us to conclude.

The actor-network perspective chosen is used not to point to human/non-human interactions, but to emphasise micro-interactions that lead to the construction of networks and support the mobilisation process. Instead of focusing on the structure or on the diffusion of a structure (Abrahamson, 1991), we favoured an approach focusing on the process underlying the construction of a structure.

The first conclusion is that the institutional entrepreneur's work entails enrolling heterogeneous actors in three different spheres. These are different, but complementary to Aldrich and Fiol's one (1994): we also try to go beyond a simple internal/external presentation of the mobilisation process.

- A global network (strategic), composed of actors who have a direct interest in the project but not in its day-to-day management;

[182] We should also stress limitations and further research opportunities :

Our focus has been on understanding sequence and linearity issues in the earliest time of institution creation promoted by leverage. However, we were unable to study the process in the other periods of mobilisation until the institution-in-the-making (Lawrence et al., 2002) actually becomes a given. "How do networks evolve?", "Are iterations still needed?" are questions concerning sequence and linearity of the process that may point to a very different configuration of the mobilisation scheme. Impact of the early mobilisation process on the rest of the process would also need to be assessed.

Moreover, the third element that may characterise the mobilisation process, pace, was only mentioned in the first section. The reason that is put forward is that we only looked at the early period of the mobilisation process. However, pace has a tremendous impact on the final state of the institution and the process in its global nature would need to be analysed to account for a complete description of the event. Two years were needed in the case study example to reach the first irreversibility: is it long or short? Were the following steps as long?

- A local network (operational), composed of "technicians" who carry out the project but lack decision/authoratative power over the global nature of the project;
- The project's greater environment that is constituted by actors who are not directly involved in the project but who may influence or threaten it.

The dynamic perspective that we took by following the mobilisation micro-processes allows me to bring forth a second contribution: iterations occur between global and local networks constituting a negotiation space that the institutional entrepreneur needs to manage. The institutional entrepreneur navigates between the three spheres and constitutes the essential link between the three.

An important conclusion to draw from this categorisation, which is our third contribution, is the fact that in the early phase of the mobilisation process, the new institution is promoted essentially from and for the outside world. The global network and the greater environment are external to the project and are mostly concerned with the global performance of the project. However, it is shown how important their mobilisation was and how many efforts the institutional entrepreneur put into this. Much iteration occurred between the local network and the global network on the one hand, and between the wider environment and the global network on the other hand. By acting this way, the institutional entrepreneur aims at gaining and aligning support. Recalling Fligstein and Mara Drita's (1996) and Hargadon and Douglas' (2001) works would tend to favour this conclusion. Indeed both Delors' struggle to create the Single Market Project and Edison's efforts to build an understanding of the electric system illustrate the process of the construction of a space and its boundaries rather than a definition of its internal governance mechanisms. The ZHT failure, recalled earlier, also supports this finding: after two years of work, the project was still embroiled in details. By focusing first on space definition and postponing issues of governance, J.Therme managed to avoid power issues and to move the project forward. This comes as a strong element: alignment (as a requirement towards institutionalisation) occurs based on an external recognition when dealing with multi-level situations.

This has direct and clear implications for entrepreneurs engaged in the promotion of institutional change when several institutional, organisational, geographic and cognitive levels are involved. First, change may not be led from the inside to the outside of the organisation at the risk of facing resistance based mainly on power issues. Recognition from outside partners via their successful enrollment sets the project's frame, which, once done, can move on to technical details. The environment should not be forgotten as it pressures (positively or negatively) the course of the project: it is eventually able to determine its survival. The entrepreneur therefore needs to identify leverage points within the environment. He can only do so based on his framing of future worlds. Thus, when promoted by an institutional entrepreneur and encompassing multiple levels, institutional building cannot completely rest on path-creation; it requires some elements of anticipation. The issue that this statement raises is: how can the institutional entrepreneur manage these elements in conditions of uncertainty? What kind of tools can be

developed? These questions open research lines for scholars. They constitute an invitation for further exploration of the micro-processes at stake in institutional change promoted by institutional entrepreneurs.

Appendix 1 – Alceste® analysis report (extract: beginning and Classe 1)

```
* Logiciel ALCESTE (4.7 - 01/12/02) *
 ------------------------------------

 Plan de l'analyse :numtPhL.pl ; Date :  4/ 8/**; Heure : 17:51:21

 C:\Program Files\ADT-Image\&&_0\
 numttrpcorriées apresPhL.txt
 ET 1 1 1 1
 A  1 1 1
 B  1 1 1
 C  1 1 1
 D  1 1 1 0 0
 A1   1   3   0
 A2   3   0
 A3   1   1   0
 B1   0   4   0   1   9   0   1   1   0
 B2   2   2   0   0   0   0   0   0
 B3  10   4   1   1   0   0   0   0   0   0
 C1   0   121
 C2   0   2
 C3   0   0   1   1   1   2
 D1   0   2   2
 D2   0
 D3   5   a   2
 D4   1  -2   1
 D5   1   0

 ----------------------
 A1: Lecture du corpus
 ----------------------

 A12 : Traitement des fins de ligne du corpus :
 N° marque de la fin de ligne :

 Nombre de lignes étoilées :        760

[…]

Classification Descendante Hiérarchique...
 Dendrogramme des classes stables (à partir de B3_rcdh2) :


                ----|----|----|----|----|----|----|----|----|----|

 Cl. 1 ( 353uce) |--------------------------+
            13                             |--------+
 Cl. 2 ( 571uce) |----------------------+    |        |
            12                        |----+        |
            14                        |             |-----------+
 Cl. 5 ( 358uce) |----------------------+             |           |
            15                                       |           |+
 Cl. 3 ( 594uce) |------------------------------------+           |
 Cl. 4 ( 352uce) |--------------------------------------------------+

 ----------------------
 C2: profil des classes
 ----------------------

 Chi2 minimum pour la sélection d'un mot     :        3.31

 Nombre de mots (formes réduites)            :       1070
 Nombre de mots analysés                     :        899
 Nombre de mots "hors-corpus"                :        760
 Nombre de classes                           :          5

        2228 u.c.e. classées soit      61.360510%

 Nombre de "1" analysés                         :       8182
 Nombre de "1" suppl. ("r")                     :       2307
```

```
Distribution des u.c.e. par classe...

 1eme classe :   353. u.c.e. 1242. "1" analysés ;  285. "1" suppl..
 2eme classe :   571. u.c.e. 2243. "1" analysés ;  664. "1" suppl..
 3eme classe :   594. u.c.e. 1830. "1" analysés ;  494. "1" suppl..
 4eme classe :   352. u.c.e. 1406. "1" analysés ;  438. "1" suppl..
 5eme classe :   358. u.c.e. 1461. "1" analysés ;  426. "1" suppl..

-------------------------
Classe n°  1 => Contexte A
-------------------------
Nombre d'u.c.e.                 :    353. soit : 15.84 %
Nombre de "uns" (a+r)           :   1527. soit : 14.56 %
Nombre de mots analysés par uce :   3.52

num   effectifs   pourc.    chi2 identification

  16     2.   3.   66.67    5.82      A cooperati+f
  24    19.  27.   70.37   60.94      A europeen+
  35     3.   5.   60.00    7.33      A francais+
  38    15.  45.   33.33   10.54      A grand+
  48     7.  13.   53.85   14.16      A internationa+l
  57    12.  23.   52.17   23.00      A mondia+l
  59    17.  33.   51.52   31.97      A nationa+l
  74     7.  20.   35.00    5.55      A premier+
  89     3.   3.  100.00   15.96      A structura+l
 109     6.  10.   60.00   14.69      G europe
 111     5.   5.  100.00   26.62      G paris
 112    13.  19.   68.42   39.73      G rhone
 113     8.   8.  100.00   42.65      G toulouse
 118     3.   4.   75.00   10.52      N agence+
 121     7.   8.   87.50   30.92      N alliance+
 122     5.  11.   45.45    7.27      N amont
 129     3.   4.   75.00   10.52      N atout+
 143     3.   3.  100.00   15.96      N brique+
 146     5.  12.   41.67    6.03      N cadre+
 160     4.  10.   40.00    4.40      N coeur+
 163     3.   6.   50.00    5.26      N comparaison+
 167     3.   4.   75.00   10.52      N conferenc+e
 171     3.   4.   75.00   10.52      N cours
 211     2.   3.   66.67    5.82      N espace+
 248    21.  42.   50.00   37.45      N laboratoire+
 280    22.  48.   45.83   33.09      N niveau+
 298     4.   4.  100.00   21.28      N photo+
 322     4.   6.   66.67   11.65      N promotion+
 337    10.  16.   62.50   26.31      N region+
 341    11.  24.   45.83   16.36      N reseau+
 352     3.   3.  100.00   15.96      N seminaire+
 363     3.   7.   42.86    3.84      N succes
 364     5.   5.  100.00   26.62      N sud+
 374     2.   4.   50.00    3.51      N tour+
 391     2.   4.   50.00    3.51      N zone+
 397     2.   3.   66.67    5.82      V aller.
 415     4.   7.   57.14    8.98      V constitu+er
 447     2.   4.   50.00    3.51      V inscrire.
 460     3.   4.   75.00   10.52      V particip+er
 509     6.  16.   37.50    5.67      Y base+
 578     7.   9.   77.78   26.00      Y numer+16
 602     5.  15.   33.33    3.46      Y responsa<
 629    17.  25.   68.00   51.58        alpes
 632     4.   4.  100.00   21.28        applied
 642     7.   7.  100.00   37.30        bernin
 645     5.   5.  100.00   26.62        biomerieux
 657     2.   3.   66.67    5.82        cadre_structurel
 660     3.   4.   75.00   10.52        castelletto
 663    28.  43.   65.12   79.84        cea_leti
 670     6.  12.   50.00   10.56        cmos
 671     3.   4.   75.00   10.52        cnet
 672     6.  12.   50.00   10.56        cnrs
 673    10.  13.   76.92   36.59        cnrt
 684    14.  22.   63.64   38.06        crolles
 685    13.  15.   86.67   56.81        crolles_2
 686    22.  23.   95.65  111.02        csem
 710     5.   5.  100.00   26.62        equipementiers
 712     7.  11.   63.64   18.94        euraccess
 713     4.   4.  100.00   21.28        eurimus
 716     3.   3.  100.00   15.96        faure
```

```
 726    37.  65.   56.92   84.74        grenoble
 727     8.  11.   72.73   26.83        grenoblois+
 734    11.  11.  100.00   58.72        iemn
 739    27.  28.   96.43  138.11        imec
 740     2.   4.   50.00    3.51        implication+
 749     4.   6.   66.67   11.65        inside
 752     2.   4.   50.00    3.51        intel
 757    11.  13.   84.62   46.38        laas
 759     4.   5.   80.00   15.47        lab+
 760     4.   5.   80.00   15.47        leader+
 761    39. 128.   30.47   21.78        leti
 762     5.   5.  100.00   26.62        lille
 763     5.  13.   38.46    5.02        logiciel+
 765     3.   3.  100.00   15.96        lyon
 769     2.   4.   50.00    3.51        marketing
 777     9.  22.   40.91   10.47        micro_
 778    38.  63.   60.32   96.17        Minatec
 783     3.   3.  100.00   15.96        motorola
 786     5.   9.   55.56   10.69        nano
 792     5.   6.   83.33   20.55        nanosciences
 793    14.  39.   35.90   11.97        nanotechnologie+
 795     5.   5.  100.00   26.62        nexus
 800     8.  14.   57.14   18.02        objets_communicants
 812     6.   6.  100.00   31.96        philips
 819     3.   5.   60.00    7.33        plateformes_technol
 827     8.  28.   28.57    3.45        pole_d
 828    13.  19.   68.42   39.73        pole_Minatec
 829     6.   7.   85.71   25.71        polygone
 836     2.   4.   50.00    3.51        proteom+
 850     2.   4.   50.00    3.51        reseaux_nationaux
 851    13.  13.  100.00   69.46        rmnt
 852     8.  10.   80.00   31.01        rousset
 865     5.   8.   62.50   13.11        soitec
 870    22.  33.   66.67   64.89        stm
 895     3.   5.   60.00    7.33        vs
 905 *   2.   4.   50.00    3.51 *      s
 908 *  22.  91.   24.18    4.94 *    0 avec
 920 *   3.   4.   75.00   10.52 *    2 point
 973 *  42. 209.   20.10    3.13 *    8 en
 988 *   3.   6.   50.00    5.26 *    J deux
 989 *   4.  10.   40.00    4.40 *    J million+
 995 *   2.   3.   66.67    5.82 *    M AEPI
1016 *   5.   5.  100.00   26.62 *    M FT_R&D_R&D
1024 *   7.   7.  100.00   37.30 *    M IEF
1026 *   3.   3.  100.00   15.96 *    M IMEP
1035 *   3.   3.  100.00   15.96 *    M LPM
1036 *   3.   3.  100.00   15.96 *    M LTM
1037 *   3.   8.   37.50    2.82 *    M M
1038 *   3.   6.   50.00    5.26 *    M MEMS
1041 *   2.   4.   50.00    3.51 *    M MPO
1043 *   5.   6.   83.33   20.55 *    M NMRC
1062 *   2.   3.   66.67    5.82 *    M SPM
1130 *   3.   3.  100.00   15.96 *      *numt_B59
1131 *   4.   4.  100.00   21.28 *      *numt_BB27
1137 *   3.   4.   75.00   10.52 *      *numt_BD36
1138 *   3.   3.  100.00   15.96 *      *numt_BD43
1165 *   3.   3.  100.00   15.96 *      *numt_BH56
1184 *   5.   5.  100.00   26.62 *      *numt_BR28
1185 *  24.  24.  100.00  128.87 *      *numt_BR29
1186 *   4.   4.  100.00   21.28 *      *numt_BR30
1189 *   6.   6.  100.00   31.96 *      *numt_BR34
1195 *   4.   4.  100.00   21.28 *      *numt_BT28
1211 *   2.   4.   50.00    3.51 *      *numt_BV41
1237 *   5.   5.  100.00   26.62 *      *numt_BZ43
1244 *   3.   3.  100.00   15.96 *      *numt_C54
1245 *   5.   5.  100.00   26.62 *      *numt_C56
1291 *   5.   5.  100.00   26.62 *      *numt_CN38
1294 *   2.   4.   50.00    3.51 *      *numt_CN41
1349 *   4.   4.  100.00   21.28 *      *numt_DB27
1387 *   2.   3.   66.67    5.82 *      *numt_DF35
1403 *   7.   7.  100.00   37.30 *      *numt_DH32
1408 *   7.   7.  100.00   37.30 *      *numt_DH37
1415 *   5.   5.  100.00   26.62 *      *numt_DJ30
1445 *   3.   3.  100.00   15.96 *      *numt_DP62
1446 *   4.   4.  100.00   21.28 *      *numt_DP63
1486 *   5.   5.  100.00   26.62 *      *numt_DT51
1487 *   7.   8.   87.50   30.92 *      *numt_DT54
1506 *   7.   7.  100.00   37.30 *      *numt_DZ36
```

```
1508 *   3.   9.    33.33    2.07 *      *numt_DZ46
1517 *   7.   7.  100.00   37.30 *      *numt_E48
1521 *   8.   8.  100.00   42.65 *      *numt_E55
1530 *   3.   3.  100.00   15.96 *      *numt_E68
1608 *   4.   9.   44.44    5.54 *      *numt_EX58
1614 *   3.   3.  100.00   15.96 *      *numt_EZ29
1625 *   3.   3.  100.00   15.96 *      *numt_FB37
1633 *   4.   4.  100.00   21.28 *      *numt_FB51
1635 *   3.   3.  100.00   15.96 *      *numt_FB53
1636 *   5.   5.  100.00   26.62 *      *numt_FB54
1637 *   4.  11.   36.36    3.49 *      *numt_FB55
1638 *   3.   3.  100.00   15.96 *      *numt_FB57
1639 *   9.   9.  100.00   48.00 *      *numt_FB58
1686 *   6.   6.  100.00   31.96 *      *numt_FN52
1700 *   4.   4.  100.00   21.28 *      *numt_FR42
1731 *   6.   6.  100.00   31.96 *      *numt_GF58
1732 *   6.   6.  100.00   31.96 *      *numt_GF60
1733 *   4.   4.  100.00   21.28 *      *numt_GF62
1739 *   7.   7.  100.00   37.30 *      *numt_GL40
1743 *   3.   5.   60.00    7.33 *      *numt_GL73
1744 *   4.   4.  100.00   21.28 *      *numt_GN30
1747 *   4.   4.  100.00   21.28 *      *numt_GN42
1752 *  11.  11.  100.00   58.72 *      *numt_GN49
1753 *  10.  10.  100.00   53.36 *      *numt_GN50
1755 *   3.   3.  100.00   15.96 *      *numt_GN52
1756 *   6.   6.  100.00   31.96 *      *numt_GN53
1757 *   8.   8.  100.00   42.65 *      *numt_GN54
1767 *   3.   3.  100.00   15.96 *      *numt_GP59
1768 *   3.   3.  100.00   15.96 *      *numt_GP61
1779 *   5.   5.  100.00   26.62 *      *numt_GT36
1786 *   3.   6.   50.00    5.26 *      *numt_GV39
1788 *   6.   8.   75.00   21.07 *      *numt_GX27
1816 *   4.  10.   40.00    4.40 *      *numt_N41
1820 *   3.   5.   60.00    7.33 *      *numt_Q32
1821 *   3.   4.   75.00   10.52 *      *numt_R64

Nombre de mots sélectionnés   :  173
```

Appendix 2 – Factorial analysis report

DiagoRC: General program for two diagonal inner product analysis
Input file: C:\CG\Aurélie\5 classes\tab5themes.cpta
--- Number of rows: 102, columns: 6

Total inertia: 0.121059

Num. Eigenval. R.Iner. R.Sum |Num. Eigenval. R.Iner. R.Sum |
01 +5.4712E-02 +0.4519 +0.4519 |02 +2.5327E-02 +0.2092 +0.6612 |
03 +1.8598E-02 +0.1536 +0.8148 |04 +1.6277E-02 +0.1345 +0.9493 |
05 +6.1436E-03 +0.0507 +1.0000 |06 +0.0000E+00 +0.0000 +1.0000 |

File C:\CG\Aurélie\5 classes\tab5themes.cpvp contains the eigenvalues and relative inertia for each axis
--- It has 6 rows and 2 columns

File C:\CG\Aurélie\5 classes\tab5themes.cpco contains the column scores
--- It has 6 rows and 4 columns
File :C:\CG\Aurélie\5 classes\tab5themes.cpco

Col.	Mini	Maxi
1	-1.341e-01	1.774e-01
2	-1.025e-01	8.780e-02
3	-6.779e-02	9.455e-02
4	-6.059e-02	7.261e-02

File C:\CG\Aurélie\5 classes\tab5themes.cpli contains the row scores
--- It has 102 rows and 4 columns
File :C:\CG\Aurélie\5 classes\tab5themes.cpli

Col.	Mini	Maxi
1	-8.864e-01	3.693e-01
2	-5.530e-01	3.962e-01
3	-2.545e-01	5.111e-01
4	-4.243e-01	3.648e-01

Chapter 7 - Genesis of the Institutional Entrepreneur's Discourse: Insight from an Ethnomethodological Perspective to Dialogue

1 Introduction

This chapter deals with the contribution of discourse to institutional theories in the context of new institution building. There is a definite focus on the role of discourse in the literature devoted to strategies to create, maintain or disrupt institutions. It is an essential element in the process of sensemaking (Weick, 1995) and sensegiving (Gioia and Chittipeddi, 1991), a tool used to define new identities (Creed et al., 2002) and to promote new frames (Snow and Benford, 1992; Rao et al., 2000). Some authors even argue that institutional entrepreneurship is primarily a discursive activity since it aims at influencing structures that underlie institutional foundations (Phillips et al., 2004; Suddaby and Greenwood, 2005; Munir and Phillips, 2005). Attention has been drawn to the ways language is used to justify action and to convince people of the need for change. Rhetoric, as the art to persuade with arguments, has been used for that purpose (Greenwood et al., 2002; Suddaby and Greenwood, 2005). Other scholars, interested in discourse issues, have put emphasis on factors surrounding the discourse and how they might influence it, focusing on macro-discourse (Hardy and Phillips, 1999; Lawrence and Phillips, 2004). But analyses are focusing on content. However, discourse analysis does not concentrate only on texts, but also on production and interpretation processes (Ervajec 2004). Little attention has been devoted to the understanding of practices that actors need to develop in order to be able to use discourse as a means to create, maintain or disrupt institutions. It is this gap that we aim to fill by focusing on conditions that allow a discourse to perform, which means looking at the conditions of its production and reception. For that matter, we shall draw from ethnographic works on dialogue and conversation analysis because they have covered these aspects in detail.

In this paper, we examine how an institutional entrepreneur who works at creating a new institution creates the conditions that allow his discourse to perform. The setting is the Grenoble region and its constitution as a micro and nanotechnologies innovation centre. The focus is put on the emergence of the mobilisation process, where discourse plays a crucial role. One actor, Jean Therme, promoted the new institution project based on PowerPoint™ presentations and constructed speakers to duplicate his discourse and used others to multiply it in diverse environments. Heterogeneous audiences were targeted because the project involved multi-level organisational and geographical layers. These strategies allowed initiating and maintaining a dialogue over time.

This paper addresses literature on institutional work. It argues that the institutional entrepreneur needs to set up an infrastructure to ensure the continuity of the dialogue between the promoter of institutional change and potential supporters. This article takes as a starting point that the performance of a discourse depends both on the content of the arguments, but also on the conditions of production and reception of the discourse. Attention is put on all of the partners in the conversation: audiences to be mobilised but

also other speakers that support the institutional entrepreneur in different environments: they are called duplicators and multipliers. Institutional work is compared to a 'discourse company' with its machinery as well as its distribution channel and commercial agents. The institutional entrepreneur sets up this company: he is a manager, and not only an entrepreneur.

The paper begins by positioning the role of discourse in institution-building theories. By drawing on new rhetoric analysis and conversation analysis, we then argue that practices that allow discourse to perform are essential elements to consider for unveiling institutional work's complexity. Second, we describe methods used to study Minatec, seed of the Grenoble micro and nanotechnology innovation centre and present the case study. Third, we present the result of the analysis and explore what practices were developed to increase performance of the discourse. Conclusions follow.

2 Discourse Performance in Institution Building

2.1 Discourse and Institution Building

Institutional work to create, transform or disrupt institutions is highly oriented towards discourse, especially when it involves agents actively promoting institutional change. Discourse is understood in its broader sense as Grant et al. define it: "structured collections of texts embodied in the practices of talking and writing […] that bring organizationally related objects into being as these texts are produced, disseminated and consumed" (2004: 3). It impacts all aspects of the mobilisation process carried out by the institutional entrepreneur, from legitimacy-gaining to frame-building. Scholars working on institutional entrepreneur's strategies illustrate many cases which imply the use of discourse: making it known that a new element is desirable or appropriate in the existing norm and value system (Rao, 1994; Haveman and Rao, 1997; Maguire et al., 2004); using specific views of the world which define what type of actions are legitimate or what results are most desirable (Fligstein, 1997); bringing the problem to a broader ideological agenda (Holm, 1995); lobbying for social change (Wade-Benzoni et al., 2002); bargaining, negotiating (Fligstein, 1997), manipulating (Zimmerman and Zeitz, 2002; Fligstein and Mara Drita, 1996), influencing (Demil and Bensédrine, 2005).

2.2 Interactivity and Performance of the Discourse

Two elements are brought out in these examples. First, the interactivity that institution building implies. In the mobilisation process, the institutional entrepreneur meets potential supports, speaks with them and his/her discourse is the support to build new identities (Fligstein and Mara Drita, 1996; Maguire et al., 2004) or to collectively make sense of the world (Weick, 1995).

Second, the performance of the discourse is implicit in all case studies; the institutionalisation of the institution in the making is the ultimate proof of the performance of the discourse. Framing (Strang and Meyer, 1993), even more than the examples cited above, implies a role for the discourse to perform because the "framer" ought to convince people of the need for change and then to convince them of the relevance of his proposal. Maguire et al. (2002: 669) consider an element of framing as a "persuasive argumentation" while Suddaby and Greenwood (2005) points to rhetoric. Rhetoric is "discourse choice against power[183]" (Meyer, 1986: 105). It can be defined as the use of the most appropriate and accurate argument to convince (Perelman, 1970): Suddaby and Greenwood illustrate how arguments based on ethos, pathos or logos are advantageously used in specific circumstances to carry institutional change. Using narratives is another way to make use of rhetoric: because narratives relate to finding the right argumentation mode by linking events (or arguments) in a particular sequence, a chain which structures reality. Connections can either be logically brought to the attention of the audience (the speaker emphasizes a link between a cause that s/he wants to defend and an event which is already accepted by the audience); or they can propose links between events that are not directly related, a situation in which the speaker may 'invent' or propose a linkage that s/he considers as relevant (Perelman and Olbrechts-Tyteca, 1970).

2.3 Conditions Allowing Discourse to Perform

To propose the right argument to the right audience is only one side of rhetoric. But, rhetoric also considers the conditions under which discourse can effectively perform.

- The Question of the Audience

Central to Perelman[184] is the question of the audience: without common agreement between two parties that a debate can occur, it is impossible to even consider arguing. Therefore, there are conditions for the discourse to circulate.

> "pour qu'il y ait argumentation, il faut que, à un moment donné, une communauté effective des esprits se réalise. Il faut que l'on soit d'accord, tout d'abord et en principe, sur la formation de cette communauté intellectuelle, et ensuite sur le fait de débattre ensemble une question déterminée: or, cela ne va nullement de soi" (1970: 18).

Secondly, the audience is created by the speaker: s/he needs to know her/his audience so as to anticipate the reception of the message and to integrate it while the discourse is still at its generation stage, so that the audience will be convinced. These are conditions that are linked to the creation of discourse.

It is close to contemporary communication theories, more specifically those labelled as communicational argumentation[185] (e.g. Breton, 2000), which consider that creating,

[183] Author's own translation from "le choix du discours contre la force"
[184] Perelman's view of rhetoric includes both arguments and circumstances that make them relevant

modifying or influencing the reception context is part of the argumentation process. Gergen and Mcnamee (2000) go in this direction and evaluate the conditions under which what they label as "transformative dialogue" can emerge. "Transformative dialogue" can be seen as a way to collectively build meaning: the two authors based their argument on the diagnosis, therapy and management of everyday life in mental disorder situations. The interaction that this sort of dialogue involves is also particularly relevant when dealing with institution building because the quality of the dialogue induces the quality of its results. This example sheds light on the context of exchange in which argumentation is taking place considering that the sole content of the arguments (i.e. their coherence, their logic etc) cannot explain the success of a conviction process.

- The Question of Interaction Between Speakers

Interactivity of the process is often implicit, less often explained in case studies that focus on institutional change promoted by an agent. Dialogue and conversation studies on the contrary, focus on this aspect. Another advantage offered by conversation and dialogue analyses rests on their interest for the context that favours exchanges between interlocutors, and not only content of discussions.

We use Sacks (1984) as the main source to build on these theories. As an ethno-methodologist studying mechanisms that allow human coordination, he demonstrates that details of conversation's organization can provide a better appreciation of the manner to do things and the kinds of techniques human beings use to organize their interactions. We argue that the enrolment process can be assimilated to a sort of conversation or at least to a conversational mode due to the interaction between parties and the social construction of the dialogue that occurs.

Conversation analysis focuses on three aspects (Whalen and Raymond, 2000). They are briefly presented here because they highlight how a conversation is organised so that it may become a constructive dialogue.

- Organization of Sequences

Any conversation is made up of a series of interactions between the persons involved. These are not only a succession of discursive interventions; most often one is linked to the previous and to the next ones. Sacks argues that studying how these sequences work can highlight the coordinating mechanism of conversation. For example, a 'first' [sentence, group of sentences or proposal] can call for a single 'second' or a range of alternative 'second' – the latter being more or less favorable to the initial 'request'[186]. The initiator of the 'first' tries to avoid less preferred 'second' and could, for that matter, develop 'pre

[185] It regroups either theories considering that arguments (their diffusion) are characterised by their communicational context or theories that are interested in public communication practices

[186] This scheme is also known as the "summons-answer sequence" the link between the first turn of a sequence – it predicting a specific action to be realized by the receiver in the next turn– and the answer of the recipient.

type actions' *i.e* preliminaries to a 'first'. These are designed to check possibilities that the 'first' induces an unfavourable 'second' and thus to avoid a frontal denial (Schegloff, 1968).

- Turn taking

For a conversation to occur *i.e.* for a series of turns to happen, multiple speakers need to be involved, otherwise, it becomes a monologue. The question here is centred on apprehending when a new speaker joins in. For the next speaker to speak, each turn ought to be recognized as being complete – at least this is what Sacks et al. (1978) describe in their 'transition relevance place'. However, it is still possible that a speaker does not start where the previous speaker stops. Turn taking can indeed only be determined locally and it cannot be determined in advance.

- Repair

> "any of the systems and contingencies implicated in the production and reception of the talk – articulation, memory, sequential, syntactic, auditory, ambient noise, etc – can fail" (Schegloff, 1979: 269)

Therefore, it is necessary to provide repair mechanisms so that troubles can be noticed and resolved as soon as possible. Troubles in hearing, speaking or understanding, are essentially dealt in a 'repair initiation opportunity space' found Schegloff et al. (1977). They also argue that repair activities are mostly self-repair ones i.e. the speaker is him/herself more inclined to provide the repair in the following turn.

These elements have largely been ignored in current institutional change work. However they emphasise the work entailed prior to the saying of the argument (and even before it is constructed) to increase chances of reaching the designated target. This is why the present paper shall consider the following as research questions:

Under which conditions can the institutional entrepreneur ensure the performance of discourse which promotes institutional change?

3 Methods

Pursuance of the emergence process of Minatec (innovation center in Micro and NanoTechnology) is based on an in-depth case study structured around archive work, on-site observation and interviews. Minatec presents a number of characteristics which make it an appropriate object of study to answer the proposed research question. The method chosen reflects the research interest in the process rather than the results. This section presents the case study and the main features of data collection and analysis.

3.1 Site

The Grenoble region witnessed important changes in its organisation between the late 1990's to mid-2005. The region is known for its success in the micro electronics industry from the 1970s onwards. However, a closer look at its organisation shows a discontinuity in the nineties, while the region now demonstrates a new dynamism. The turning point was the setting up of Minatec: it was the inaugural step that in 2002 initiated the transformation of the local institution that represented the microelectronic industry in Grenoble. Up to the set-up of Minatec in January 2002, Grenoble was locked on a monolithic trajectory whose roots reached back to the early time of hydroelectricity. Despite some glorious periods from the sixties to the mid-nineties, which witnessed a growth in microelectronics-related fields, the region was unable in the second half of the nineties to renew its activities; and by the end of the nineties, in a global game situation, the region was threatened by competitors, unable to regenerate itself up to the point that its most important electronic laboratory, CEA-Léti[187], was expected to be shut down. Against all odds, Minatec, an alliance between a public research laboratory, CEA-Léti and two engineering schools from INPG[188], was funded (64% of the €150 millions were provided by local/regional public authorities[189]). More than 3500 people now work on site. A third of the total space is devoted to industrial partners (both start-up and large industries). The originality of the project is to unite on a single place institutional partners that take part in the R&D process (research, training, industrial valorisation). It is symbolised by a new building with three aisles that each represents one of the three partners. This specific effort translates the vision of the actors concerning the organization of the micro and nanoelectronics industry i.e. a place where all actors - from different organisational and institutional backgrounds, but also from different disciplines, from biology to electronics and informatics, are closely interlinked. The shift was associated with an important change in the structure of the relationships between actors and in the practices of scientists and engineers involved. These changes find their origin in the funding of the Minatec building which allowed additional pieces of the institutional puzzle (incentive schemes, regulation..) to take place between 2002 and 2005.

Moreover, this setting is original because of the heterogeneity of the actors called in the coalition: not only were they cognitively, organizationally and institutionally diverse but they were also geographically very different. Indeed, the institutional redefinition

[187] CEA stands for Commissariat à l'Energie Atomique (Nuclear Energy Centre). Public research centre, it is located in three main locations on the French territory – Grenoble is one of them. Léti is the CEA-Grenoble electronics laboratory (Laboratoire d'Electronique et de Techniques d'Instrumentation). CEA-Léti had in 1999 more than 600 persons working on site. It generated some of the most successful start-ups in the region : EFCIS in 1972 (which over time and fusions/acquisitions became ST Microelectronics), SOITEC in 1992 (world leader in "silicium on insulator" in 2005)

[188] INPG is a consortium of 9 engineering schools, at the graduate level. ENSERG (specialized in electronics) and ENPG (specialized in physics) were the two schools joining the project. INPG along with CEA-Grenoble were the co-supporters of Minatec project

[189] City, community of communes, department and regional levels. They provided 2/3 of the €150 millions required to fund Minatec. Two ministries were also involved by in a minor way (less than 8% of the overall budget)

involved local actors who did not always have strategic decision power, which required reaching actors at the national or higher geographical levels who did not have the same agenda, leading to mobilisation difficulties. The multiplicity of levels of analysis brings a new perspective to the study of the action of an institutional entrepreneur. Indeed, the mobilisation process of all supports was organised by a single actor, Jean Therme, head of CEA-Grenoble, who is here considered as an institutional entrepreneur. Rare enough to be noticed, he is widely recognized as the father of this new institution.

Last, the institution was promoted largely based on a discursive strategy in the period under scrutiny, i.e. the emergence phase of the institution, otherwise referred to as Minatec construction. It emphasises the dominant element that discourse represents in the institutional work. J.Therme organized 102 presentations over the institutional emergence period, which runs from late 1999 to January 2002, when Minatec was officially funded. They were the principal support, conveyor and element of his conviction process. He addressed himself to more than 955 persons from a large range of backgrounds, occupations and geographical locations.

3.2 Data Collection and Analysis

As Minatec construction involved locally a series of actors (CEA, INPG, local public authorities), the initial archive work involved digging in each of the partners' own archives. If the different drafts of Minatec agreement of funding were located at the department level and technical details on the buildings were found at the Minatec team office, no strategic documents could be located except at J.Therme's office. Even stranger, we could not find any strategic reports, any notes from meetings, and any documents that circulated among the partners. The only documents presenting the project and accounting for its evolution were the 102 PowerPoint™ presentations by Jean Therme. Each and every time he presented the project he used a PowerPoint™ format. The presentations were not only the medium of the official communication of the actor; they were a support for thoughts, for idea sharing and discussion and called for a reaction of any kind (such as approval, rejection, doubts, spreading of the information) from the audience. They should therefore not be considered as academic presentations. They were project presentations which discussed all aspects of the project: its definition, its positioning, its goals, its components and its funding. They evolved over time in the number of slides, in the themes presented and in the audience for whom they were designed. Therefore, they constituted the historical traces that allow reconstructing the discourse as it was emerging.

J.Therme's archives, for the matter of following the evolution of the project, were exceptionally well organized, presenting, in folders, each presentation, one by one, with all the slides included, as a repository of presentations and a slide collection.
They also included details varying from the agenda of the event during which the presentation took place, to manual annotations of changes to be made on slides, or first versions of a specific slide. The richness of the PowerPoint™ presentations in the archives

does not only lie in their content but also on the complementary information they give (date of the presentation, location of the meeting, audience etc). In addition, as the staff involved with the institutional entrepreneur in the early phases of the process were still in place at the time of data gathering, it was possible to fill in the gaps, when any, and supplement information, considering the location, date, and audience of each presentation.
The availability of the context in which the presentations took place made it possible to know who the other speakers were, if any. As the project matured, speakers other than the institutional entrepreneur were partially presenting Minatec: they were members of Minatec team, the official face of Minatec. Following their activities, such as the meetings they organised, the set-up of a Minatec website or of Minatec conferences also gave insights on the Minatec unfolding process. Formal interviews with major actors in the funding process allowed confirming some ideas derived from the analysis of PowerPoint™ presentations.
Furthermore, work on archives was complemented by the analysis of the institutional entrepreneur's personal calendar. The aim was to define whom he met and what the object of the meeting was. This should have allowed taking into consideration the fact that more informal meetings may have occurred. Surprisingly, it was not the case: all persons introduced to the project went through a Power Presentation.

J.Therme's discourse is built around the PowerPoint™ presentations. They were therefore used to follow his overall discursive strategy from their construction to their implementation and their re-use by other actors.

Data are based on J.Therme's activities in designing PowerPoint™ presentations, presenting them to various audiences and setting up the Minatec Team. Data were organised in the collection process so that it was possible to follow over time the evolution of themes included in the presentations and the audiences to which presentations were submitted. For that matter, audiences were characterised based on their organisational and geographical affiliations. PowerPoint™ presentations were characterised based on the themes they dealt with. A content analysis was run to determine broad themes. A software was used to ensure objectivity of theme determination. The co-word analysis software Alceste® was selected because it permitted to take into account an important feature of PowerPoint™ presentations: they are based on a succession of slides which each has its own internal coherence. For example, if a slide includes charts and graphs, all elements are considered as part of the same basic unit of analysis (named UCE, which is roughly the equivalent of a sentence within a paragraph). The basic unit of analysis (UCI) that Alceste® considers was therefore 'the slide'; while it was still possible to take into account all other slides because the analysis was run on the totality of slides included in the PowerPoint™ presentations.

As each presentation was designed for a distinct purpose, and aimed at provoking a specific reaction from the audience, PowerPoint™ presentations could be assimilated to a form of conversation induced during the first presentation to which an audience 'A' attended; the conversation could later continue if the same audience 'A' was present at

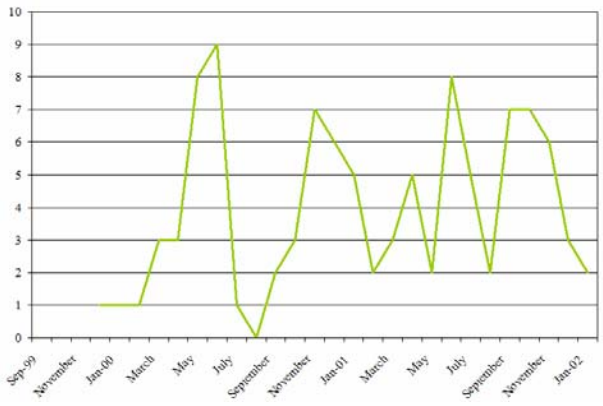
another presentation or if it interacted with other elements that carried the discourse: it could be the Minatec Team, the Minatec website, the Minatec conferences organised or any other elements that was linked to Minatec.

Reactions to the presentations were not measured directly because it would have necessitated visiting each of the 955 persons who attended a presentation. The most convincing proof that a dialogue occurred was found in the reinforced link between discourse and action that finally led to the creation of the institution, Minatec being only the first step. It was possible to evaluate, still indirectly, the reaction of some of the audiences: the evolution of the structure of the attendees was an interesting element to consider to evaluate the response: when an organisation was represented in the audience of the presentation 'N' by its CEO and in the presentation 'N+5' by department managers or by members of the legal department, it may be interpreted as a rather positive answer or a demand for more specific details. Moreover, information published in newspapers (technological ones like *IEEE* or general press ones like *Les Echos*) also showed an answer from the audience: journalists were invited when a regional public authority representative, a European commissioner, or a Minister attended meetings: they reported these persons' comments after the presentations.

4 Case Study

The dialogue between the institutional entrepreneur and potential supports is initiated at the occasion of meetings based on J.Therme's PowerPoint™ presentations. In total, during the emergence phase of the mobilisation process[190], 102 PowerPoint™ presentations were delivered (Figure 1).

Figure 1 Presentations of the project over a two-year period



[190] from the end of 1999 – beginning of the mobilisation process, to January 18th, 2000 – signature of MiNaTec agreement of understanding

4.1 Obvious Partners' in the Conversation

- J.Therme and his PowerPoint™ presentations

'Obvious partners' in the discussion are J.Therme and the audience attending the presentations. These presentations are not "regular" PowerPoint™ presentations. Not only do they inform the attending audience, but they are designed on an individual basis to fulfil a specific purpose depending on the audience and the time period. They can therefore also test an idea or request approval on it. Thus, here, the audience is not passive; on the contrary, it could be considered as a partner in a discussion. The discussion evolved as subjects under investigation varied across time as well as the type of persons in the assembly (see as illustrations Figures 4 and 5).

Thus, the first turn in the sequence was J.Therme's set of PowerPoint™ presentations. The slides were created or transformed to suit the temporality of the project. In total 760 different slides composed the 102 PowerPoint™ presentations. Over time, J.Therme constituted a library from which he would draw to create his presentations. Each slide went through the same construction process[191]. First, J.Therme transmitted a number of research lines to his assistant who gathered data[192] illustrating the point he was willing to make. Based on this information, J.Therme drew the first draft of the slide, which was passed on to a second assistant, who was in charge of translating the paper-format slide into a PowerPoint™ format. The design of slides adhered to specific codes that the assistant needed to respect. J.Therme set up these codes so that the audience could easily grasp the essence of the slide. For example, sentences were written in red when there was an urgent need to act or when there was a problem; green was used when actions were achieved; orange was used when action was currently being handled, etc. As the assistant argued, a slide is a specific means to communicate information: it needs to be simple enough, but the difficulty resided in the fact that it should be precise and concise at the same time. When the first draft of the electronic slide was finished, it underwent a review process by J.Therme with his assistants. Each slide went through this process until it was accepted and incorporated into the final presentation. Each public presentation was itself a test bed: depending upon the reaction of assistance, it would be modified, rearranged or suppressed. Each presentation underwent a review process before and after the official public presentation: before, it ensured the coherence of the slides as a whole to support the case, while after, the review process looked at misfits between the slides presented, the point to be made and the way it was received by the audience.

[191] See Figure 7 in Chapter 4 for a detailed representation of the slide's construction process

[192] Examples include the funding of the institution over the years, its start-ups and spin-offs (to support the links between research and industry), but also more global numbers such as the evolution of the number of components in an integrated circuit (to support the increase in research needed to allow reducing the size of elements on a chip).

- Variety of the Audiences

The audiences to be reached were diverse both organisationally and geographically speaking (Figures 2 and 3) : these were local public authorities who would fund the largest part of the €150 million required for the new building to be constructed; national finance, education and research ministers who had to give their agreement to institutionally support the project; European commissioners who ought to support the project because Europe could not possess several centres of the same kind. CEA general management in Paris needed to believe in the project because CEA-Grenoble management could not take any major strategic decision[193]. CEA-Grenoble staff needed to adhere to the project. Industrial partners have been requested to support the initiative because they would be the ones providing research contracts in the future, etc.

Figure 2 Distribution of attendees by broad categories (all presentations)

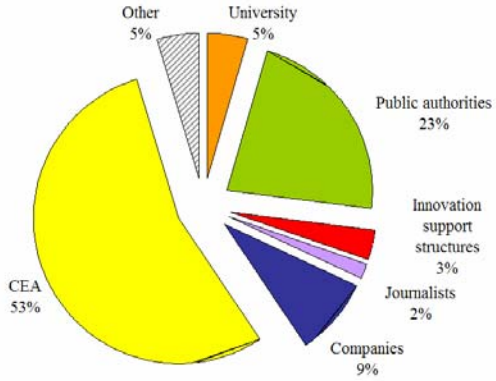
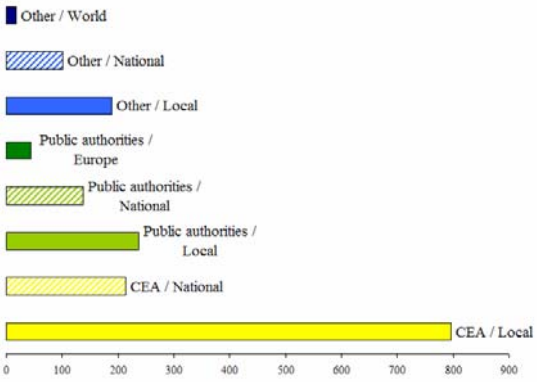


Figure 3 Number of attendees by geographical localisation (all presentations)



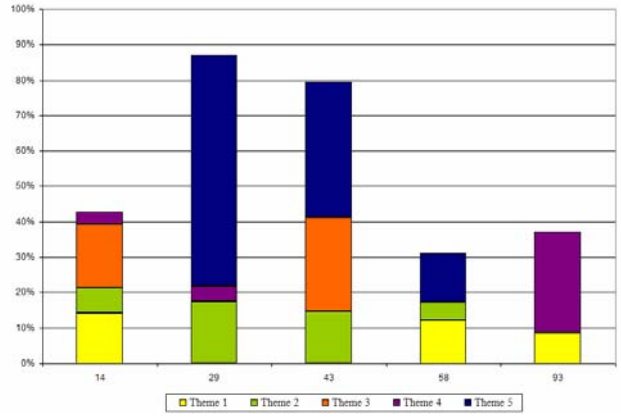
Note that the number of attendees is higher than 955 because some of them attended to more than one presentation and were therefore counted several times.

[193] Minatec funding (CEA provides 26% of the funds for the new buildings and several millions for additional technological platforms) implies a redefinition of CEA-Grenoble activities around micro and nanotechnologies to the detriment of nuclear energy: therefore CEA general management was required to agree to the project.

Attendance each had a specific role to play in the design of the project. Therefore, the PowerPoint™ presentations were designed to fit them: themes presented varied between audiences. For example, the opposition between Figures 4 and 5 clearly shows the difference in themes presented to CEA-Grenoble management committee (Figure 4) on the one hand and to local public authorities (Figure 5) on the other hand. Themes 1, 2 and 3 are dominant in Figure 5: they are relatively generic themes which presented Minatec globally while themes 4 and 5 were more oriented towards practicalities: business plan and CEA-Grenoble internal reorganisation. The procedure that led to theme definition is presented in Textbox 1.

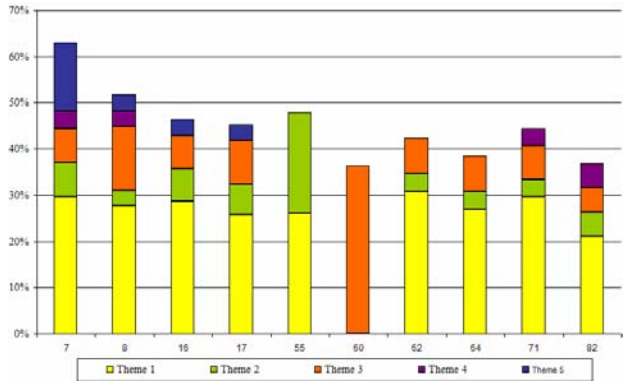
To increase the proposal acceptance probability by specific audiences, J.Therme prepared "prevention" actions to anticipate potential oppositions to the project. J.Therme explains his strategy to reach as many people as possible and to leave as little ground unvisited as possible. An example of such action was found in the multiplicity of presentations that he did to local town hall authorities (of small towns and villages in the valley) so that when the project would be presented at the regional assembly, representatives of these communities would already have heard of the project, asked questions, pointed to specific problems and finally accepted the project.

Figure 4 Theme evolution for the presentations designed for the CEA-Grenoble management committee.



Presentation numbers

Figure 5 Theme evolution for the presentations designed for the local public authorities.



Presentation numbers

Textbox 1 Process through which themes are defined using Alceste® software

Alceste®'s basic principle is to group together words that appear often in the same unit of analysis; the basic unit of analysis is here a sentence within a slide. Cluster of words are designed by the software based on the number of co-occurrence of words: five clusters result from the analysis. Within each cluster, differences exist between words: some are more important than others. Criteria to characterise words and determine "core words" include:

- The number of occurrences of each word (throughout the 760 slides and within a specific class): an arbitrage needs to be done between the number of appearance of a word among the total population of slides and the number of appearance of a word exclusively with words associated to the same cluster
- Its position within the cluster of word (measured by the Chi² value): the higher the Chi² value, the most central to the cluster the word is.

Table 1 - Characterisation of words within a cluster

		Word 'X' position compared to the core of cluster "N"	
		Word 'X''s chi² > average of chi² of cluster N	Word 'X''s chi² < average of chi² of cluster N
Relative presence of word 'X' in Cluster 'N'	> 80%	Central/specific	Peripheral/ specific
	< 80%	Central/generic	Peripheral / generic

By considering these two elements, "core words" (characterised as central/specific in Table 1) are determined. They are the basis to name the cluster of words to which they belong. Other types of words, especially peripheral/specific ones and central/generic, come to refine the definition of the cluster up to the determination of a central theme. The analysis leads to the following definition of clusters (themes):

- Cluster 1: Minatec position compared to other national or European clusters;
- Cluster 2: Definition of MiNaTec 'institution-to-be' concept;
- Cluster 3: Scientific and Technological scope of actors to be involved in MiNaTec;
- Cluster 4: Technical and financial concerns about MiNaTec construction (incl. Business plan.);
- Cluster 5: Position of MiNaTec vis-à-vis CEA.

The analysis report also points to specific slides that are affected to clusters. This tag adjunct to slides allows identifying themes in each presentation by re-affecting each slide to the presentations it belongs to. Therefore, presentations can be characterized by the relative importance (weight) of each theme. This permits to follow over time the sequence of themes. Slides unaffected to a cluster are classified within a "x" cluster.

4.2 "Constructed Speakers" in the Conversation

J.Therme and the audiences of the presentations were not the only partners in the dialogue. J.Therme constructed and introduced other speakers in the conversation. They were introduced little by little in the dialogue so that if the latter was initiated with J.Therme's presentations, the exchange could continue with other speakers in other places. These speakers can be human beings but also non-human ones: their reason for being is that they provide a message to a specific audience.

Each of the speakers in the following two sections (constructed or "despite their will" speakers) also provided assistance to the audience they were targeting by deepening or

enlarging the scope of the conversation compared to J.Therme's initial discourse and/or re-explaining or detailing J.Therme's arguments.

All were linked to Minatec more or less directly. As they entered into the conversation, they were added as Minatec parts, which resulted in them being added to the Minatec webpage.

- The Minatec Team

The first constructed speaker was the Minatec team. It possessed its own office buildings and a secretariat. It was institutionally[194] and physically autonomous. It represented Minatec as an existing entity, even when it was not yet running[195].

The Minatec team was the official face of Minatec, with a director, J-F.Veyrat. He was in charge of the Minatec day-to-day management dealing with local public authorities and the CEA legal department to reach an agreement on technical and financial details of the project (including contacts with the architect, relations with the city authorities, management of the site, etc). As the project moved forward, J-F.Veyrat participated actively in spreading the discourse. Using J.Therme's own slides, J-F.Veyrat presented the project and its advancement essentially at the local and regional levels. His work was essential to the success of the project. Former CEA-Grenoble deputy manager, he was appointed to the head of the Minatec team himself (as well as other members of the Minatec team) because, using his own words, he had "nothing to lose" as he was only a few years from retiring. This way, there was no power issue involved at the Minatec management level[196]. Moreover, his position as a mayor of a small village outside of Grenoble was an asset for his appointment: he already knew many players at the local and regional public management level, which helped him in his task.

While J-F.Veyrat was Minatec's face locally, J-C.Guibert represented it at the international level. Originally an engineer at CEA-Léti, J-C.Guibert was in charge of industrial collaborations with international partners. His task was both to report from developments happening in competing centres throughout Europe and the world and to present the unfolding of the Grenoble region, so that even outside of France and Europe, the project would be promoted. His target was very different from J-F. Veyrat: he focused on potential scientific and technological partners.

- The Minatec Website

Speakers in the conversation were not only human beings but also objects. So was the Minatec website (www.minatec.com). The website reproduced information being given

[194] The Minatec team was indeed presented as an entity different from CEA

[195] Remember that the official founding date of Minatec is January 2002 while the Minatec team was established in 2001

[196] By choosing a group of persons essentially close to retirement Therme reduced frictions (at least temporarily) between the backers about the future head of Minatec.

live by J.Therme or the Minatec team. On the one hand, it allowed information to be carried further. In that sense, the website was an infrastructure for the information to be transmitted. On the other hand, it was part of the discourse as it showed Minatec as an existing place with its own mission statement, information letters, industrial reports, contact team, and links to financial supporters, etc.

- The Minatec Architect Model

The architect's plan and models that were used in the PowerPoint™ presentations and which were also available on the internet or as a giant poster on the website also formed part of the discourse. They entered directly in to interaction with assistance (during the presentations) or with the potential audiences (through the Minatec website). For audiences to consider it a reality, sketches were presented as early as the year 2000.
The new building was structured so that communication could flow between research and industrial units. Emphasis was placed on open spaces and information meeting spaces. The architect's plan and models relayed the information that Minatec was a location where creativity and innovation would take place.

4.3 Speakers Introduced "Despite Their Will" in the Conversation

These speakers also aimed at maintaining continuity in the conversation. However, contrary to previous speakers, they were not originally designed to take part in the conversation. They were partially turned away to reach specific audiences.

- The Minatec conferences, the Observatory for Micro and NanoTechnologies (OMNT) and the national and European networks[197]

All three were also speakers in the conversation that J.Therme was trying to develop with as many audiences as possible. By using recognized scientific entities as speakers, J.Therme targeted scientists and engineers at the local, national and international levels.

Minatec conferences were organized initially by national and European networks in micro and nanoelectronics. Set up in 2000, they brought together European and international researchers and industries which presented their work and results. They were conceived as a thematic series of conferences that existed before Minatec was named: Minatec, as a name for the innovation centre, was selected after this series of conferences to increase the spreading out of the project and to create coherence among all activities happening in Grenoble in the field of micro and nanotechnologies.

[197] These are considered speakers and not arenas (Callon, 1986) because they do not aim at structuring a community around a specific problem

These conferences were organised in coordination with the OMNT. Created in 2001 as a joint effort between CEA and CNRS[198] in a national framework program, OMNT produces analyses and worldwide reviews of subjects related to micro and nanotechnologies every two months. This scientific monitoring consists of of a network of 170 scientific and technical experts from universities and public research organizations in France. It also organises a conference presenting various challenges in relation to micro and nanotechnologies to a diversified audience each year.

European and national networks (e.g. EURIMUS, NEXUS, RMNT) are located on the same site as Minatec. Some even moved in specifically from other European places. The fact that they were located there had a large impact on the diffusion of information throughout geographical and institutional sites via their newsletters, websites or conferences. Moreover, all these entities were, from the beginning, full-part of the project: they were indeed thought to integrate the Minatec site within the House for Micro and NanoTechnology (MMNT), the Minatec animation structure[199].

Minatec conferences, the OMNT and S&T networks supported the transmission of the discourse and even complemented it in scientific and technological communities. This was essential to ensure the scientific legitimacy of Minatec because J.Therme's PowerPoint™ presentations did not deal with these aspects. Theme 3 only presented the current activities of partners in the project. J.Therme was only presenting current technologies without referring in detail to future scientific and technological programs within Minatec (see Appendix 1).

- Ideas' Lab

Ideas' Lab is also to be considered as one speaker. Created in 2001, its name is the acronym for "Interactive Devices for Emerging Applications and Services Laboratory". Funded in a collaborative effort by France Telecom R&D, Hewlett-Packard Labs, ST Microelectronics and CEA, this research platform was an innovative attempt to foster the development of "communicative objects and testing them on consumers based on a approach by their uses"[200]. Considering the failure of many technological innovations, despite the quality of the underlying technology, the founders chose an interdisciplinary approach bringing together designers and artists, sociologists, anthropologists along with specialists in software, microelectronics and Microsystems, but also operators, industries and potential final users of these communicating objects. They mobilised numerous members of the Grenoblian community both from industry and academic research. This structure was then unique in Europe, which attracted attention from industrialists.

[198] CNRS is the National Scientific Research Centre (Centre Nationale de la Recherche Scientifique). CNRS possesses laboratories in all scientific fields. These laboratories are localised everywhere on the French territory.
[199] The MMNT was designed to be Minatec « public face » : it is a resource centre for companies setting up on site, a social and coordination centre for actors on site and an international relation centre.
[200] cited from www.minatec.com

Therefore, it promoted the creativity and dynamism of the actors who were (would be) involved in Minatec.

5 Discussion

The essential point is that a dialogue between potential backers and the institutional entrepreneur is organised. At least it is the strategy exploited by J.Therme as attempts s to convince different organisational, institutional and geographical levels. As the network of support is built, other speakers enter the conversation taking over from J.Therme and ensuring a continuation of the channels of communication. Speakers are therefore more than orators: they are agents that establish the conditions under which a dialogue between parties can occur.

5.1 Creation of the Conditions for Discourse to Perform: Creating a Discourse, Making it Circulate and Instilling a Dialogue.

We split speakers into three categories: the institutional entrepreneur's own elements of the discourse with the PowerPoint™ presentations and his slide factory, duplicators, and multipliers of the discourse. This is to say that institutional change is achieved as the agent of change provides mechanisms to ensure discourse's performance through these three categories. The choice of J.Therme to use such an information technology format impacted on the infrastructure and technical capabilities he had to set up (Benghozi and Licoppe, 2001).

- Slide Factory: a Full Team Devoted to the Production of Slides

The creation of slides and their assembly into a presentation format is so systematic and based on a division of work that one can talk of a slide factory and refer to it as "an industry of the slide production". As Leca et al. (2006) argue, the strategy developed by the institutional entrepreneur is not only discursive but he relies on a material dimension, here the creation of slides.

The backbone of discourse fabrication involved more than the institutional entrepreneur himself. It is constituted more than five people, of two of whom were working on a full-time basis.

- Duplicators

Besides the live discourse of the institutional entrepreneur, there are a number of intermediaries, both human and non-human, relaying and transmitting the same information Jean Therme provided: they are named duplicators.

To duplicate, based on the Merriam and Webster dictionary, means "to make double or twofold" and also "to make a copy of". One needs to copy or reproduce something when it cannot be transported as such. Information has the characteristic of being reproduced at no cost. Moreover, some of the presentations are publicly available as they are part of the follow-up package of events. So the use of the terminology "duplicator" needs to be clarified in another way; it is found in looking in further details at the duplicators' actions. Two reasons make it clearer. The first is linked to the carrier of the message himself, his intrinsic attributes. J-F. Veyrat and J-C.Guibert have been personally chosen by the institutional entrepreneur because of their past activities and the networks they are part of. The institutional entrepreneur's message should be carried by a person who has access to certain groups that the institutional entrepreneur does not and/or cannot have access to. J-F. Veyrat for example, based on his past assignment as mayor of a village close to Grenoble, has connections in the political sphere of the region. Due to his many visits of sites abroad, J-C.Guibert has many contacts with industrial and scientific partners. The messengers were chosen based on the legitimacy they had in the sphere they would be in interaction with when presenting Minatec.
The second reason concerns the necessity to promote the project to different audiences and to as many audiences as possible. Different audiences have different needs depending on the information they should get. For instance, J-F. Veyrat was the deputy director of CEA-Grenoble: he was responsible for practical aspects of the management of the site. This is why he was in charge of all aspects in relation to the new construction including budget, business plan, technical requirements, roadwork within the centre, architect's design etc. All these matters were important for the actors who were backing up the project financially, predominantly local and regional public authorities. He was therefore the most suitable person to present these aspects. Another feature of the promotion to many audiences is that it is not possible to infinitely multiply the number of carriers for each type of audience either for cost reasons or for the lack of finding the suitable messenger. This is why another carrying means had to be developed: the website.

The notion of duplicator sends us back to the very definition of the role of the institutional entrepreneur. DiMaggio (1988) defines him as an agent deploying resources to create, shape and empower institutions; but how and where to get them is still little known. Becker (1997), working on the moral entrepreneur, or Fligstein and Mara Drita (1996) on the political entrepreneur show the need for the entrepreneur to mobilize resources from different backgrounds. Aldrich and Fiol (1994) propose the idea that the entrepreneur should develop strategies of surfing between four levels of social context to promote new industry development: organizational, intra-industry, inter-industry and institutional "within which founding entrepreneurs build trust, reliability, reputation and finally institutional legitimacy" (1994:649). Duplicators help the information to be brought to these different levels. With the legitimacy borne from their previous activities, they favour the passage from one level to the next. Complementary to J.Therme's own actions, the action of J-C.Guibert is for example important at the intra-industrial level, while that of J-F. Veyrat's one is crucial at the institutional level. This finding highlights the fact that the

process towards the emergence of a new entity (should it be an industry, an institution or an organization) does not have to be linear but that it could be run at different levels simultaneously.

Duplicators carry the message of the institutional entrepreneur in the same kind of environment as he does but deepen it: they take time presenting the project at length, focusing on a specific aspect of the discourse depending on on the audience. They reinforce the existence of the project just by being: their existence is a tangible proof of Minatec's own development. By bringing the latest information concerning the creation of a legal status for Minatec to the backers, J-F. Veyrat strengthens J.Therme's discourse. It is the same for J-C.Guibert: being present at an international conference or visiting laboratories abroad makes Minatec "alive" for S&T partners. The website is an essential tool for the national and international visibility of the project: at first, it is difficult to know whether Minatec already exists or not; it regroups duplicators and multipliers in a coherent manner.

- Multipliers

Multipliers are defined as those actants carrying out the existence of Minatec in an indirect manner. They add to the information supplied by either the institutional entrepreneur or the duplicators. But they are also an important part of the discourse as they enable it to be spelled out in other contexts.

The term of "multiplier" was chosen for two reasons. First, it translates the meaning of multiplicity. Based on the American Heritage® Dictionary of the English Language, multiplicity is defined as "the property of being multiple". And as a boundary object (Star and Greisemer (1989), Minatec is multiple. For people working in CEA, it is a virtual reality: they heard about it, they know some teams will move in the new buildings, but they do not know who, as they do not yet see the buildings, Minatec is a very vague image. For local and regional public authorities, Minatec is, first of all, a project carried out by a team represented by J-F. Veyrat, having its office in CEA's buildings. For national authorities, Minatec is a project that is part of the regional development in microelectronics that has already been supported for thirty years. For European authorities, as well as for major players in the field, Minatec is to be the most important location in Europe developing the next generation of chips for the semiconductor industry. In the same way, inhabitants of Grenoble, scientists in France have, each, their own mental picture of what Minatec is. But this does not fully explain the terminology of "multiplier". This word also carries the meaning of multiplying the effects several times. It is, for example, used in macroeconomics in the "multiplier effect" concept: the increase of one dollar in government spending leads to a higher increase in the overall economic wealth due to cumulative effects. Following the same mechanism, multipliers widen the institutional entrepreneur's discourse, both in its scope and in its geographical diffusion.

Both meanings are included in the notion of "multiplier": they transmit complementary information concerning Minatec (notion of multiplicity) while they also carry some information to audiences that might not have been reached in any other way (notion of multiplication). The complementary function is essential, as multipliers give life and actual content into the project but also as they bring credibility to it. OMNT, for instance, conveys a scientific credibility to Minatec as an entity, because it is composed of more than 170 experts in the various fields of micro and nanotechnologies. It produces reports on the evolution of the fields that demonstrate the analytical capabilities of Minatec. The latter is reinforced by the conferences and events organized on OMNT's behalf. The Ideas'Labs, as a prospective and multidisciplinary evaluation centre, confers a vision of Minatec as working on how the technology will interact with society.

Multipliers therefore enlarge the initial message of the institutional entrepreneur when carrying it to different environments than he did. Indeed, in his presentations, J.Therme did not deal with the scientific and technological content of Minatec: the audience only knows that three large programs (nanobiotechnologies, new energies and telecom) will structure the site. This did not say much about the site to engineers and scientists. OMNT, as a monitoring unit with a focus on seven aspects of nanosciences and technologies, brings more content to Minatec giving hints on what features of nanosciences and technologies will be looked up in Minatec.

5.2 The Institutional Entrepreneur: More than a Vision Shaper, a Company Manager

The institutional entrepreneur develops an equipment to mobilize support: slides, duplicators, multipliers are part of a tool-kit. Each fulfils a specific objective, targets a specific audience and is, in consequence, purposefully designed (Table 1). But more than that, the case study highlights the work that the institutional entrepreneur needs to devote to create conditions for his discourse to eventually perform: it entails building a discourse based on the audience, initiating a dialogue and maintaining it.

The slide factory, multipliers and duplicators are elements of a company with the institutional entrepreneur as a leader: more than working at diffusing his vision, he creates and manages a company whose aim is to construct and diffuse it.

The slide factory is more than an image to illustrate the work of the institutional entrepreneur. The construction of the discourse of the institutional entrepreneur is an activity in itself: an activity that is close to the activity of any other company. The institutional entrepreneur is therefore more than an entrepreneur because not only does he shape a vision but he implements it by creating a company, with all its components including services. Slides are the production of this factory. Duplicators play the role of a commercial and marketing department, while multipliers ensure the distribution functions.

The institutional entrepreneur also makes sure that important persons will support the project in this case, it is the national government who "gave its blessing" by providing funding, even a minor amount. It is also the European commissioner or the French science Minister visiting the potential future location. All these are activities linked to the discourse that may be considered trivial like designing PowerPoint™ presentations, but that actually reveal essential practices associated to the institutional entrepreneur's work.

Table 1 Components of the discourse

Component	Definition	Example	Audience Target (and role)
Institutional Entrepreneur (IE)	Main message carrier	PowerPoint™ presentations	All financial backers and main personalities
Duplicators (reach the same environments than the IE)	Deepen and reinforce the message of the IE	Minatec Team (5 full-time staff)	Local representation and day-to-day project follow-up (Minatec human face)
		Website	National and international existence of Minatec
Multipliers (reach different environments than the IE)	Complement and enlarge the message of the IE	OMNT (=on-site S&T monitoring unit)	S&T community (S&T content of Minatec)
		Ideas'Lab (=user/technology onsite-laboratory)	Society and supporters (Minatec long term vision)

6 Conclusions

We have argued that building a mighty discourse for the institutional entrepreneur with the aim of mobilizing resources and support is not only related to the content of the discourse, but it is also related to other elements that need to be considered. Conditions under which discourse to promote institutional change is produced and diffused have been little studied. Yet they are essential to the performance of the discourse. As the audiences are institutionally and geographically different, they are sensitive to different elements of discourse and necessitate different approaches. This duality should be managed during the construction process of discourse. It entails creating an infrastructure, which is both the medium and the whole of the discourse. Indeed, speakers (duplicators and multipliers) are part of the discourse but also convey it. These elements are essential to allow the dialogue that the institutional entrepreneur initiates to continue and to last over time to be sure to keep supporters on board. They customize the interaction with each audience and permits to fit each audience's needs with the aim to earn its support. However, this is not to say that this strategy alone can ensure the success of the action. We have been focusing here only on a specific set of conditions that support the discourse in its performing action but others, such as coherence of the discourse in itself (see for example studies on narration) or with the audience (see for example Kahane, 2005) should be added. We consider them as a complementary way to narratives and rhetoric to better encompass the role of discourse in institutional change.

We highlighted two complementary dimensions to maintain the conversation with diverse audiences over time: duplication and multiplication. Both play a specific role in the diffusion of the discourse. The former relays the same information as the institutional entrepreneur provides, while the latter complements the view on the discourse from a different perspective. Duplicators deepen the institutional entrepreneur's discourse focusing on specific aspects, while multipliers deepen it by fleshing it out with content. We thereby show how institutional change can be prepared, and therefore managed and organized.

We showed that the emergence of Minatec was run as a company because discourse is not only a tool, it is itself a result of the institutional entrepreneur's activities: goods are the slides produced in the "slide factory", functions of commercialisation and marketing taken over by the duplicators while distribution is ensured by the multipliers. The institutional entrepreneur does not only share a vision; he sets up the conditions for his discourse to be constructed and to circulate. One way to achieve this objective is by building a company whose business lies in producing and diffusing the institutional entrepreneur's discourse. Latour and Woolgar's laboratory shadows (1979) are here pinpointed.

We also aimed at going beyond the heroic entrepreneur idea, beyond the myth of THE entrepreneur, in the sense that the action of the institutional entrepreneur does not "just"

involve social and personal skills, but also necessitates managerial ones that the institutional entrepreneur needs to activate in the early phase of the mobilisation process.

Appendix 1 Extract from Alceste® report – Theme 3

This table shows the four kinds of vocabulary extracted by Alceste and that constitute "Theme 3" Scientific and Technological scope of actors to be involved in Minatec. The Explanation of Alceste basic principles is found in Textbox 1 of the body of text.

The core of Theme 3 is constituted by Central / specific and Peripheral / specific words : they are words that are all related to present technologies (early 2000's technologies used in microelectronics)

Central / specific	Peripheral / specific	
systeme+	imagerie+	mecan+16
composant+	circuits_integres	microelectronique
microsystemes	report+	plast+16
sante+	magneti<	transmissi+ble
optique+	telecom+	concevoir.
transistor+	instrument+er	ecrans_plats
puce+	perform+ant	passi+f
telecommunication+	applica<	peripheriques
optronique+	informat+16	vente+
caracteris<	materiau+	heterogene+
micro+	plaque+	offre+
architect<	disposit+ion	dsys
	multimedia+	enregistr+er
	verre+	loi_de_moore
	nanoelectronique+	medica<
	nm	microcapteur+
	petit+	nanometr+
	couches_minces	opto
		physico
Central / generic	**Peripheral / generic**	
ADN	materiaux	
RF	biolog+16	
complementa<	integr+er	
miniaturis+	technolog<	
SOI	electron<	
dsis		
biopuces		
microelectronique+		
concept+ion		
plateforme+		
microtechnologie+		
dopt		
silicium		

Conclusion générale

1 Introduction

Le concept de l'entrepreneur institutionnel a été choisi comme angle d'approche au cas de Minatec, puisque nous avons bien affaire à un agent dont l'action vise à construire une nouvelle institution. Cela est constaté par :

- la mise en place de nouvelles pratiques, pratiques de collaborations, notamment autour des plateformes,
- de nouvelles normes concernant le comportement des partenaires dans les collaborations,
- de nouvelles règles, par exemple dans le partage de la propriété intellectuelle dans les coopérations précompétitives,
- de nouveaux systèmes d'incitations par exemple pour l'octroi de financement pour des projets risqués.

La revue de littérature a mis en avant la profusion d'études qui éclairent le rôle de l'entrepreneur institutionnel. Mais elle a également mis en évidence le manque d'attention portée à la complexité de l'action menée par celui-ci. L'entrepreneur institutionnel crée des communautés, délimite de nouvelles frontières ou établit de nouvelles structures de gouvernance dans le but d'institutionnaliser le changement. Les moyens d'actions pour y parvenir ont été regroupés en trois sous-ensembles :

- l'établissement de stratégies de gain de légitimité pour recruter des supports,
- l'utilisation d'un discours pour communiquer sa vision,
- l'établissement d'irréversibilités (Callon, 1991) pour retenir sur le long terme les partenaires.

Les études de cas illustrent la diversité de ces moyens mais peinent à souligner la complexité sous-jacente à chacune de ces stratégies. Sans avoir la prétention d'établir un travail comparable à celui de Bruno Latour et Steve Woolgar (1979) dans *la Vie de Laboratoire*, cette thèse veut se positionner dans le même esprit, en questionnant les pratiques de l'entrepreneur institutionnel : Comment travaille-t-il ? Comment parvient-il à produire une nouvelle institution ? Néanmoins, à la différence de la *Vie de Laboratoire*, l'approche ne relève pas de l'ethnographie mais de la gestion et utilise un ensemble de concepts de sociologie, d'ethnographie et de stratégie pour enrichir le propos présenté.

Les principales contributions théoriques et managériales tirées de l'étude ici réalisée sont présentées dans cette conclusion.

2 Contributions théoriques

2.1 L'action de l'entrepreneur institutionnel dans l'espace : définir et articuler trois espaces de transformation : un réseau global, un réseau local et un environnement plus large

L'action de l'entrepreneur institutionnel est constituée d'une somme d'actions qui se déroulent à différents niveaux et à différents moments dans le temps. La difficulté de la tâche de l'entrepreneur institutionnel est de mener de front ces deux variables, spatiale et temporelle. Ses démarches varient dans le temps, au fur et à mesure de la progression du projet et de l'institutionnalisation de la vision proposée.

Tout d'abord, le Chapitre 6 met en avant la nécessité pour l'entrepreneur institutionnel de constituer non pas un, mais plusieurs réseaux, lors de la phase d'initiation de la construction de l'institution. Au départ, l'effort de l'entrepreneur institutionnel se situe à l'échelle d'un projet qu'il lui faut défendre, dans un premier réseau pouvant être qualifié de stratégique (réseau global). Ce dernier regroupe des supports qui s'intéressent principalement à la performance générale du projet, c'est à dire à son succès ou à son échec et qui ont un pouvoir de vie ou de mort sur celui-ci. Un deuxième réseau implique les acteurs mettant en œuvre le projet (réseau local). Les problématiques des deux réseaux peuvent être contradictoires engendrant un premier jeu de tensions, que l'entrepreneur institutionnel doit gérer en multipliant les allers-retours (les itérations) entre les deux réseaux pour conserver l'ensemble des acteurs mobilisés au cours du temps malgré les évolutions qui peuvent découler de la résolution des conflits entre les deux groupes. La sociologie de la traduction (Callon et Law, 1987 ; Callon, 1991) vient donc ici éclairer le travail de mobilisation et d'enrôlement qu'effectue l'entrepreneur institutionnel. Cette présentation du processus de mobilisation propose une version différente de celle d'Aldrich et Fiol (1994). Ces deux auteurs se sont intéressés aux phases d'émergence d'une nouvelle industrie et établissent une segmentation basée sur un principe organisationnel : l'entrepreneur mobilisant les supports selon la proximité qu'il entretient avec son organisation. Il s'agit donc d'une différenciation, assez simple, qui oppose interne à externe. Au contraire, celle qui est défendue ici intègre le fait que les supports sont à différents degrés proches du cœur du projet et que leur caractérisation par rapport au projet (interne ou externe) ne permet pas d'éclairer le processus de mobilisation.

La thèse ajoute même un troisième niveau : l'environnement plus large (*wider environnement*) fait d'acteurs externes aux deux réseaux mais qui peuvent néanmoins l'influencer en exerçant des pressions sur l'un ou l'autre d'entre eux à l'instar des élus du département de l'Isère et de l'action prosélytique que Jean Therme mène.

La thèse d'Aldrich et Fiol, quant à la succession des étapes de la mobilisation, est également remise en cause puisque l'entrepreneur institutionnel traverse de façon permanente les trois niveaux définis (Cf. Figure 10 dans le Chapitre 6) pour maintenir la

cohérence du projet. Ainsi, il n'y a pas de généralisation possible des catégories d'audiences à mobiliser, ni de la temporalité pour le faire : les audiences doivent être construites par l'entrepreneur institutionnel lui-même. Celui-ci ne peut, de plus, pas négliger l'environnement plus large qui est également sujet à mobilisation, ce qui, au vu de l'étude de cas, nécessite un investissement lourd : c'est d'ailleurs pourquoi il développe des stratégies proactives de prévention ou « prosélytes ».

Le Chapitre 6 conclut sur le fait que l'entrepreneur institutionnel crée l'institution DE l'extérieur et POUR l'extérieur : en effet, le réseau global et l'environnement plus large ne sont pas partie prenante de l'institution (ils ne participeront pas à la vie de l'institution) que représente la nouvelle organisation de l'industrie de la microélectronique, pourtant, ils représentent une part importante des acteurs mobilisés. L'entrepreneur ne construit pas l'institution de l'intérieur, laissant de côté par exemple la définition des structures de gouvernance, ce qui lui permet d'éviter les enjeux de pouvoirs, et ainsi d'éviter les écueils du précédent essai (ZHT). La reconnaissance extérieure permet de construire la structure qui s'organisera alors en interne.

2.2 L'action de l'entrepreneur institutionnel dans le temps : la narraction et la mise en place de tests pour gagner en légitimité

Le Chapitre 5 se penche sur la façon dont l'entrepreneur institutionnel mobilise les acteurs dans les différents niveaux ci-avant cités. La vision de l'entrepreneur institutionnel ne leur est pas présentée directement ou abruptement, comme acquise et figée. Au contraire, les itérations présentées dans le Chapitre 6 sont utilisées dans le but d'une construction collective de la vision. Le Chapitre 7, mettant en avant la conversation s'instaurant entre l'entrepreneur institutionnel et les différentes audiences, témoigne particulièrement des échanges. Le discours initial de l'entrepreneur institutionnel s'enrichit et se construit lors de ce processus, lui permettant de gagner en robustesse d'une part, mais également d'entretenir les relations et de maintenir dans la coalition les supports mobilisés. Le discours est donc évalué, testé périodiquement, ce qui en renforce la légitimité et permet à son porteur d'aborder l'étape suivante. C'est sous le concept de narraction que Kahane (2005) définit cette stratégie : un discours par et pour l'action. Le discours visant à construire l'institution est ponctué de tests qui valident l'adhésion des audiences. Les caractéristiques des tests, leurs modes d'évaluation et leurs critères de succès ne peuvent cependant être établis à l'avance, puisque le projet évolue au gré des itérations entre les trois niveaux : il n'y a pas donc pas à proprement parler d'échec. La Chapitre 5 propose une ébauche de qualification de ces tests qui prennent la forme d'investissements de forme, de médiateur ou de jugement (*trial*).

Une façon plus globale d'interpréter ces éléments, consiste à reconnaître la double gestion, que l'entrepreneur institutionnel mène de front, des espaces différents, comme la différenciation des réseaux et de l'environnement plus large l'indique, mais également des

horizons temporels différents. C'est à dire qu'il gère d'une part, les acteurs qui sont impliqués lors du processus de construction de l'institution, mais aussi ceux qui le seront lorsque les éléments qui la composent seront en place. Le Chapitre 5, s'attachant au passage de la vision à la réalité, illustre, en complément de la partie introductive sur les transformations de l'industrie de la microélectronique, cet aspect : l'entrepreneur institutionnel ici recrée un espace de compétition, un espace de collaboration, un espace dans lequel de nouvelles opportunités vont pouvoir se développer etc. en (re)modelant l'institution. En d'autres termes, plus propres aux théories institutionnelles, il redéfinit les identités et attribue des rôles à chacun.

2.3 L'entrepreneur institutionnel et son entreprise de fabrication et de diffusion du discours, assimilable à l'activité d'une véritable entreprise

Le troisième point fort de la thèse réside dans l'incroyable machinerie mise en place pour fabriquer et diffuser le discours. Il faut en effet réaliser que Jean Therme a présenté une fois tous les cinq jours ouvrés environ son projet et que, pour ce faire, il a construit individuellement chacune des 102 présentations en fonction des audiences rencontrées. Il a institué ce que nous avons appelé une « fabrique de transparents » dans laquelle travaillent de façon permanente cinq personnes qui préparent, construisent, modifient et assemblent des présentations jusqu'à constituer une bibliothèque de 760 transparents originaux.

Afin de diffuser ce discours, il développe une véritable stratégie marketing et développe des circuits de distribution pour son discours. L'étude de cas met en avant les notions de duplicateurs et de multiplicateurs du discours. Les premiers font référence à ces agents qui reproduisent le discours d'abord présenté par l'entrepreneur institutionnel, dans un certain type d'environnement. Les duplicateurs viennent approfondir le discours avec ces mêmes audiences et participent à maintenir le fil du dialogue, comme cela a été discuté précédemment. Les multiplicateurs, au contraire, élargissent le discours et le complètent pour atteindre des audiences que le porteur du discours n'a pas touchées.

L'analogie peut être poussée plus loin car ces activités, marketing et mise en place de canaux de distribution, sont celles d'une entreprise. Le cas présenté illustre un entrepreneur institutionnel-chef d'entreprise créant une entreprise dont le domaine d'intervention est la fabrication et la diffusion de son discours ; discours dont le but est de supporter le processus de mobilisation en vue de l'institutionnalisation de sa vision. Cette entreprise possède toutes les caractéristiques d'une véritable firme avec :

- la fabrique de transparents : usine produisant les transparents, outils indispensables de sa communication,
- l'équipe Minatec : un secrétariat et une structure opérationnelle gérant les affaires courantes, s'occupant des relations avec les architectes, de la rédaction des conventions, de la gestion du site web de Minatec,
- son service marketing,

- ses canaux de distributions,
- etc.

Les produits de l'entreprise (le discours dans les présentations) varient en fonction du temps et des audiences. Ils sont personnalisés.

Ces divers élements constituent des microprocessus dont l'analyse se révèle en fait crucial pour comprendre la construction de l'institution. L'étude de cas pointe ainsi l'organisation d'un ensemble de tâches qu'effectue l'entrepreneur institutionnel ou des acteurs à qui il délègue pouvoir. Ce qui sous-entend qu'il n'est pas le héros, seul contre tous, souvent décrit dans la littérature[201]. Au contraire, il s'appuie sur ce que la théorie de l'acteur-réseau appelle des actants (Callon, 1986) qu'il mobilise ou construit lui-même.

2.4 Les éclairages apportés au concept de l'entrepreneur institutionnel

Revenant sur l'objet de la thèse, le travail de l'entrepreneur institutionnel, la diversité et la complexité de celui-ci ont été mis en avant que ce soit dans l'effort de mobilisation (de création de communautés et de frontières) ou dans l'institutionnalisation progressive de la vision par la mise en place d'irréversibilités (Callon, 1995).

L'introduction et la revue de littérature ont laissé entendre qu'une meilleure compréhension des tâches effectuées par l'entrepreneur institutionnel permettrait d'éclairer le concept de l'entrepreneur institutionnel lui-même. Mais, cela a-t-il un sens par rapport aux recherches actuelles ? L'unité d'analyse qu'il représente est-elle pertinente ? Lawrence et Suddaby (2006) préfèrent s'intéresser à ce qu'ils appellent le « travail institutionnel » plutôt qu'à l'entrepreneur institutionnel en tant que tel, considérant que la création ou la transformation d'une institution requiert un effort collectif ; l'attention portée à l'entrepreneur institutionnel dans la littérature amène, il est vrai, davantage à une simplification de son action. Pour eux, cela conditionne la théorisation qu'appellent les chercheurs du domaine (e.g. Lawrence et al., 2004, Dorado, 2005).

En dépit de ces arguments, nous ne partageons pas ce point de vue et les recherches ici effectuées montrent l'intérêt de s'attacher à l'entrepreneur institutionnel en tant que tel. Si nous adhérons à l'aspect collectif de la construction de l'institution qui est démontrée dans le Chapitre 5 au travers de la notion de narraction (Kahane, 2005) et dans le Chapitre 7 au travers de la fabrique et de la diffusion du discours, l'analyse nous montre l'importance de l'entrepreneur institutionnel en tant qu'organisateur du travail et porte-parole. Ce dernier point est explicité ci-après.

[201] Latour et Woolgar (1979) faisaient référence aux ombres dans les laboratoires concernant le travail scientifique. Face aux similitudes entre certains travaux de la sociologie des sciences du début des années 90 et les écueils formulés ici mais aussi par des exemple par Lawrence et Suddaby (2006), on est en droit de se demander si la théorie de l'entrepreneur institutionnel n'en serait pas au même stade de son développement que l'était alors la sociologie des sciences ?

Tout d'abord, les circulations répétées entre divers univers, et la nécessité de créer un espace de négociation (Callon et Law, 1991) entre ceux-ci, indiquent le rôle de chef d'orchestre ou d'architecte (Latour et Larédo dans PROTEE, 2000) que l'entrepreneur institutionnel joue. Ces appellations sous-entendent que l'entrepreneur institutionnel ne crée pas à partir de rien mais qu'il arrange ou ré-arrange des éléments ; il est capable de saisir, à un moment donné, une opportunité. La thèse de Dorado (2005) incorporant les aspects de transparence ou d'opacité du domaine est donc ici vérifiée ; et tant le contexte que la personnalité et le parcours de l'entrepreneur institutionnel doivent être considérés pour comprendre l'émergence de la vision[202]. L'entrepreneur institutionnel devient alors comme catalyseur.

L'entrepreneur institutionnel est plus qu'un entrepreneur dans le sens schumpéterien du terme : il ne crée pas seulement une vision, il l'implémente et se trouve ainsi dans une position qui est plus proche de celle du manager que de l'entrepreneur. L'entrepreneur institutionnel peut donc être considéré comme ayant deux visages, mais à l'inverse de ce que propose Beckert (1999), le chef d'entreprise, ici présenté, ne prend pas le dessus sur l'entrepreneur uniquement lorsque l'incertitude du contexte diminue. Le Chapitre 7 montre, au contraire, que l'action de manager est immédiatement incluse dans les tâches de l'entrepreneur institutionnel. Plus paradoxal même, par rapport à la proposition de Beckert, le rôle de manager ne lui est pas imputé dans la phase finale de la construction de l'institution c'est-à-dire lorsque la concrétisation matérielle est engagée : dans l'étude de cas, la mise en place d'une structure de gouvernance pour l'institution qui représente une forme de réduction des incertitudes, ne se traduit pas par une action de l'entrepreneur institutionnel. Au contraire, l'institution est construite aussi longtemps que possible sans de telles structures, qui mettent en jeu des questions de pouvoir et de légitimité. C'est ce qui explique que l'institution ait été créée d'abord par et pour l'extérieur.

Ces éléments montrent que le terme d'entrepreneur institutionnel[203] dépasse la somme des termes « entrepreneur » et « institution » Il semble œuvrer avant tout à la constitution d'un espace (et pas seulement d'un nouvel acteur sur la scène internationale de l'industrie de la microélectronique) dans lequel des opportunités pourront être saisies.

2.5 Vers un programme de recherche

Ce travail ouvre donc deux pistes de recherches. Une première piste de recherche, autour de la notion d'entrepreneur institutionnel, pourrait s'intéresser à la transformation de son rôle au cours de la construction de l'institution. La thèse s'est intéressée à la phase initiale de l'édification de l'institution, jusqu'à la première irréversibilité (Chapitres 6 et 7) tout en

202 Les conditions d'émergence de Minatec (projet de la ZHT, délocalisation des écoles d'ingénieurs, passage à l'ère du nanomètre) et le parcours de Jean Therme (INPG-industrie-CEA-Léti) illustrent ce point qui vient ici en conclusion mais qui est ainsi vérifié.

203 Mais qu'il est néanmoins important de maintenir le terme pour conserver le rôle spécifique qu'il joue dans la création d'une institution.

présentant une vue d'ensemble de sa construction (Chapitre 5). Néanmoins, le Chapitre 5 se concentre sur la vision et stoppe l'analyse lors de la stabilisation de celle-ci en 2004. Une recherche future pourrait donc se focaliser sur l'évolution du rôle de l'entrepreneur institutionnel: perd-t-il le contrôle sur l'institution (phénomène d'éviction) dès lors que la phase de concrétisation matérielle (mise en place de normes, de routines, de règles) est enclenchée ?

Le deuxième axe de recherche vise à utiliser les théories institutionnelles dans un cadre davantage stratégique en s'interrogeant sur Minatec.
Aujourd'hui, Minatec, pôle d'innovation en micro et nanotechnologies dispose de :

- des services (décentralisés) qui assurent un certain nombre de fonctionnalités : MMNT (conférences scientifiques et représentations des réseaux d'excellence), Observatoire des Micro et des Nanotechnologies, IdeasLab (Laboratoire des usages),
- une structure matérielle : les nouveaux bâtiments,
- une vision : articulation de programmes autour du cœur que constitue Minatec.
- des programmes scientifiques et technologiques : ex : Alliance – Nanotec 300 – Minalogic,
- des programmes incitatifs propres: RTB ou Minalogic.

L'ensemble relève de l'acteur – sauf en ce qui concerne la structure de gouvernance, dont Minatec ne dispose pas. A quoi fait-on face ? Peut-on considérer qu'est ici préfigurée une forme moderne d'organisation, qui n'est ni totalement hiérarchique ni complètement de l'ordre du réseau?

3 Contribution méthodologique

La contribution méthodologique principale se trouve dans l'extraction poussée de données à partir d'archives limitées.

Nous avons été confronté au problème posé par l'utilisation des technologies de la communication et de l'information : en effet, les rapports stratégiques[204] pouvant nous aider à retracer l'émergence de l'institution n'existaient pas sous une telle forme et ont été remplacés par des présentations Powerpoint™ faites par l'entrepreneur institutionnel[205]. Il nous a donc fallu mettre en place une nouvelle méthode de traitement des archives.

Afin de retracer la construction de l'institution, nous avons montré comment on pouvait en extraire une grande quantité d'information tant sur le contexte de leur diffusion (date,

204 Pour rappel, aucun des acteurs, impliqué dans la construction de MiNaTec, ne dispose d'archives stratégiques capables de comprendre l'émergence du projet. Seul, Jean Therme, en dispose, sous la forme uniquement de présentations Powerpoint™ d'un genre particulier (e.g. Chapitres 3 et 4)

205 Cette utilisation des nouvelles technologies de la communication et de l'information est propre à J.Therme.

lieu, audiences présentes, agenda de la réunion) que sur leur contenu. Nous avons montré comment il était possible par l'analyse de la structure des présentations, de suivre pas à pas la construction de l'institution au travers de la « vie des transparents ». Les 760 transparents de base, composant l'ensemble des présentations, naissent, vivent et meurent ou se transforment. L'analyse détaillée de leur cycle de vie associée aux catégories d'audiences et aux thèmes abordés permet de mettre en évidence :

- des moments de cristallisation, lorsque des transparents fusionnent,
- des moments de décision, quand on assiste à l'apparition d'un grand nombre de nouveaux transparents,
- des périodes de mobilisation d'acteurs spécifiques.

Ces éléments sont exploités dans les Chapitres 6 et 7 plus particulièrement. Le Chapitre 4 interpelle spécifiquement les chercheurs sur la tendance croissante à l'utilisation des nouvelles technologies de la communication et de l'information dans les organisations, que ce soit par l'utilisation de présentations PowerPoint™ à la place de rapports ou par l'utilisation grandissante des emails dans la communication interpersonnelle, et lance un appel au développement de méthodes originales de traitement des données disponibles.

4 Contributions managériales et de politiques publiques

Il nous paraît important de souligner les contributions opérationnelles de la recherche. Dans un premier temps, l'étude offre des perspectives d'actions pratiques dans les cas où des acteurs souhaiteraient changer les règles du jeu de leur industrie ou domaine d'activité c'est à dire ré-organiser l'espace de compétition dans lequel ils se situent ou créer un nouvel espace. Les situations qui peuvent appeler de telles actions sont des situations impliquant des innovations de rupture justifiant des changements profonds au niveau de la réglementation, des modes d'acquisition des compétences ou de la création de marchés. Comme Hargrave et Van de Ven (2006) le soulignent les complémentarités entre management des innovations et théories institutionnelles devraient être davantage employées. Ainsi, les leçons tirées sur la façon dont une institution s'impose peuvent être utilisées dans le cadre de méthodes pour déployer une innovation radicale. Utilisant un exemple de la micro-électronique, les pratiques de l'entrepreneur institutionnel peuvent ainsi contribuer à imposer une option de long terme sur la roadmap internationale, l'ITRS.

En ce qui concerne les contributions liées aux politiques publiques[206], il ressort de la thèse, une notion de cycle de vie du cluster que représente le pôle Grenoblois en micro et nanotechnologies. Depuis les années 60, les politiques publiques de différents niveaux, ont contribué au développement du cluster grenoblois. Le cluster a été promu, au cours du temps, en alternance par des actions bottom-up (les acteurs locaux) ou par des actions top-

[206] Celles-ci ne sont pas explicitement exploitées dans la thèse mais ont donné lieu à des articles, par exemple, Delemarle (2006)

down (les ministères, le gouvernement national etc). De plus, ces actions ont été menées de façon plus ou moins explicite. Cette typologie est reprise de Fromhold Eisebith et Eisebith (2005). L'apport de l'étude de cas est de lui ajouter une dimension dynamique pour soutenir l'hypothèse qu'un cluster en émergence est promu de différentes façons avant d'être institutionnalisé en tant que cluster, c'est à dire d'être reconnu de l'intérieur et de l'extérieur comme cluster en tant que tel. La reconnaissance externe est particulièrement importante. Cette reconnaissance extérieure peut résulter d'action top-down comme l'illustre la labellisation du cluster en tant que pôle de compétitivité ou d'action bottom-up comme le montre la signature du consortium 'Alliance'. Tous deux émettent un signe fort sur la validité et la pertinence du cluster en y apportant leur soutien et/ou contribution.

5 Limites

Il existe actuellement un grand nombre de travaux s'intéressant aux développements des nanotechnologies et plus particulièrement à la relation entre science et société. Suite notamment aux scandales de l'amiante ou aux controverses sur les OGM et les biotechnologies, l'inclusion des citoyens au travers, par exemple, de débats publics est prônée. Il n'a pas été question dans cette thèse de telles consultations. Pourtant Jean Therme a largement travaillé sur la relation avec la société : n'a-t-il pas communiqué avec plusieurs dizaines d'hommes et de femmes politiques (de la ville de Grenoble, de la Communauté de Communes, du Conseil Général de l'Isère et du Conseil Régional de Rhône-Alpes pour ne citer que les instances politiques territoriales) pour les inciter à soutenir le projet de pôle d'innovation ? Les structures souhaitant instaurer un débat qui se manifestent aujourd'hui dans la région grenobloise (« Pièces et Main d'œuvre » ou « Vivagora ») n'existaient pas en 2002. Dans l'avenir, tout travail de construction d'un tel pôle réclamerait de les prendre en considération : c'est d'ailleurs ce à quoi la société Philips est confrontée alors que l'industriel organise un pôle de compétitivité[207] dans la région d'Eindhoven.

Les limites des conclusions présentées tiennent également au fait que la thèse se base sur une monographie, bien que lors du projet NanoDistrict, des comparaisons aient été entreprises avec le pôle néerlandais de nanotechnologies, MESA+ aux Pays-Bas. Néanmoins sans ce travail monographique, nous n'aurions pas pu mettre en exergue les pratiques de l'entrepreneur institutionnel dans le processus de mobilisation, que sont la mise en place d'une entreprise de construction du discours, de duplicateurs et multiplicateurs du discours. Elles constituent autant de propositions, qui pour être généralisées, devarit être testées dans d'autres situations de création institutionnelle.

[207] Ce terme est repris en néerlandais du terme français « pôle de compétitivité »

Glossaire des termes, sigles et acronymes utilisés

AACSB	Association to Advance Collegiate Schools of Business
AEPI	Agence d'Etudes et de Promotion de l'ISère
AlbanyTech	Albany NanoTech ou CNSE College of Nanoscale Science and Engineering est un centre de nanotechnologies financé en majorité par l'indusrie à l'Université d'Albany, par IBM, Qimonda, AMD, GE and Tokyo Electron (3 G$ d'investissement initial). Ce consortium est géré par IBM. Le complexe se compose d'infrastructures de recherche et de développement de prototypes de pointe pour la nano et la microélectrique, la nanophotonique et optoélectronique, les micro et nano systèmes (MEMS). Le centre dispose d'une ligne 300 mm et outils avancés comme la lithographie EUV.
Alliance	Collaboration de nature pré-compétitive entre STMicroelectronics, Philips et Freescale
Architecture	Façon d'arranger les transistors afin de leur permettre de réaliser les fonctions de base.
ASIC	Applied Specific Integrated Circuit, circuit intégré de type spécialisé conçu pour une application particulière, opposé à la notion de processeur conçu pour du calcul générique. On inclut les composants de traitement de signal et tous les composants pour les appareils électroniques dans cette catégorie.
BCA	Bâtiment des Composants Avancés
BHT	Bâtiment Hautes Technologies
CEA	Commissariat à l'Energie Atomique
CENG	Centre d'Etudes Nucléaires de Grenoble
CMOS	Complementary Metal Oxyde Semiconductor
CNET	Centre National d'Etudes des Télécommunications
CNRS	Centre National de la Recherche Scientifique
CNSI	California NanoSystems Institute
CSEM	Centre Suisse d'Electronique et de Microtechnique
Design*	des circuits et systèmes conception de l'architecture d'un composant électronique, mise en place de ses blocs (calcul, mémoire,…)
Dopant	élément ajouté au silicium pour le rendre soit conducteur d'électrons (dopé négatif, au phosphore par exemple) soit conducteur de trous (dopé positif, dopé au bore par exemple).
DRAM	Dynamic Random Access Memory, mémoire vive de l'ordinateur. Nécessite un rafraîchissement des données très régulier à la différente des SRAM Static Random Access Memory plus chères.
DRDC	Département Réponse Dynamique Cellulaires, Unité mixte de recherche (CEA/CNRS/INSERM/UJF)
DRFMC	Département de Recherche Fondamentale sur la Matière Condensée du CEA

DRME Direction des Recherches et Moyens d'Essais

DTEN Département des Technologies pour l'Energie et les Nanomatériaux du CEA. Département du LITEN

EDF Electricité de France

EFPG Ecole Française de Papeterie et des Industries Graphiques

Electronique moléculaire

Concept qui vise à créer une électronique non plus à base de matériaux cristallins semiconducteurs, mais à base de molécules. La réalisation de l'électronique moléculaire serait un pas très important vers une intégration encore plus poussée (taille d'une molécule de l'ordre du nanomètre, alors que le plus petit transistor CMOS semble se situer vers 5 nm).

EMBL European Molecular Biology Laboratory (laboratoire européen de biologie moléculaire)

ENSEEG Ecole Nationale Supérieure d'Eléctrochimie et Electrométallurgie de Grenoble

ENSERG Ecole Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble

ENSGI Ecole de Génie industriel

ENSHMG Ecole Nationale Supérieure d'Hydraulique et Mécanique De Grenoble

ENSIEG Ecole Nationale Supérieure d'Ingénieurs Electriciens de Grenoble

ENSIMAG Ecole Nationale Supérieure d'Informatique et de Mathématiques Appliquées de Grenoble

ENSPG Ecole Nationale Supérieure de Physique de Grenoble

ESC Paris Ecole Supérieure de Commerce de Paris

ESISAR Ecole de Systèmes industriels Avancés

Eurimus EUReka Industrial initiative for Micro and nanotechnology uses

FMNT-RA Fédération Micro et Nano Technologies Rhône-Alpes (FMNT-Rhône-Alpes)

GRAIN Grenoble Alpes Incubation

HEC Hautes Etudes Commerciales

IBS Institut de Biologie Structurale

IDEAS (lab) Interactive Devices for Emerging Applications (lab)

IdNano Institut des Nanosciences

ILL Institut Laue Langevin

IMEC Interuniversity Microelectronics Center

INERA Initiatives Nouvelles Energies Rhône-Alpes

INPG Institut National Polytechnique de Grenoble

INRIA Institut National de recherche d'informatique et d'automatique

INSERM Institut National de la Santé et de la Recherche Médicale

IRIA Institut de recherche d'informatique et d'automatique

ITRS International Technology Roadmap for Semiconductors (Feuille de route internationale technologique pour les semiconducteurs)

ITRI Industrial Technology Research Institute, Taïwan

Institut Fraunhofer

sorte de société savante allemande constituée de nombreux instituts répartis dans les länders et couvrant l'ensemble des domaines techniques.

LEPM Laboratoire d'Electrostatique et de Physique du Métal

Léti Laboratoire d'électronique et de Technologies et d'Instrumentation

Logiques à un électron
Composants électroniques réalisant une fonction sur un seul électron. Ce type de composant est potentiellement plus puissant car il réduit au minimum le nombre d'électrons impliqués dans la fonction (plus de 1000 pour les transistors classiques) permettant ainsi d'accroître encore la vitesse de commutation.

Loi de Moore loi de nature prédictive énoncée par Gordon Moore (un des fondateurs d'Intel) en 1965 et exprimant le doublement de la complexité des composants tous les 18 mois, revue en 1975 pour exprimer le doublement du nombre de transistors d'un microprocesseur tous les 2 ans. Cette « loi » n'a rien de physique mais constitue une observation empirique tenant compte d'un contexte technico-économique qui s'est vérifiée jusque dans les années récentes. Le coût des investissements devenant énorme, la courbe tend à s'infléchir. Les fabricants se concentrent de plus en plus sur l'aspect architecture des composants, d'où sort la notion de multi-cœurs des puces récentes. Ca ne signifie pas néanmoins que les limites techniques de la miniaturisation sont atteintes, mais que le coût d'une telle progression oblige de nombreux acteurs à ralentir leur progression vers des puces plus performantes au niveau le plus basique (la taille du transistor et partant de là le nombre intégré sur une puce).

Longueur de grille
la grille est l'interrupteur de courant d'un transistor. Plus la longueur de la grille (Dimension physique de l'espace entre les deux connections) est faible, plus la vitesse de commutation de cet interrupteur est grande. Réduire cette longueur est à la base de la progression de la microélectronique telle que vue par la loi de Moore.

LSI intégration à grande échelle

Lyon Biopole Pôle de compétitivité en biotechnologies sur la région lyonnaise.

METIS plate-forme de PME du domaine textile & papier de la région Isère regroupées pour faire face à la concurrence des pays émergents sur ces produits. L'objectif est d'inclure des micro et nanotechnologies dans ces objets pour leur apporter de la valeur ajoutée.

MinaLogic Micro Nanotechnologies et Logiciel Grenoble-Isère compétitivité - Les solutions miniaturisées intelligentes

Minatec Pôle d'innovation en Micro et Nano Technologies

MMNT Maison des Micro et NanoTechnologies

MPU MicroProcessor Unit ou CPU Central Processing Unit = microprocesseur, composant dédié au calcul générique (Intel, AMD)

Nanofils fils cristallins ou amorphes de faible diamètre présentant l'intérêt de confiner les propriétés dans une seule dimension (celle de l'axe du fil) ce qui permet de maîtriser les propriétés de façon plus fine. Des propriétés de toute nature (électrique, optique, mécanique,…) ont été démontrées au niveau fondamental, à partir de nombreux matériaux dont les semiconducteurs classiques (silicium, germanium), les oxydes simples.

Nanotubes de carbone

Assemblage d'atomes de carbone selon une structure très stable enroulée en tube. C'est un nouvel état du carbone découvert par Iijima à NEC en 1991. Les propriétés de ce matériau sont impressionnantes sur le papier : meilleur conducteur que le cuivre, 200 x plus résistant que l'acier pour 6 x plus léger, supraconducteurs à basse température, meilleure conductivité thermique que le diamant, excellent émetteur d'électrons… Les qualificatifs ne manquent pas. Les démonstrations de principe non plus. Le plus petit transistor réalisé est à base de nanotube de carbone, des écrans à émission de champ sont à l'étude à base de nanotubes. Il reste des difficultés nombreuses d'intégration de ce matériau, mais les progrès sont notables. Les intérêts économiques sont énormes. Les nanotubes sont l'emblème des nanotechnologies. Il ne fait pratiquement aucun doute que ce matériau sera utilisé dans le futur (vélo plus léger, raquettes plus résistantes,… déjà démontrées), mais nul ne peut prédire quand ni comment.

Nano2Life Réseau européen d'excellence en nanobiotechnologies

NanoBio projet mis en place par le CEA Grenoble pour monté un centre de nanobiotechnologies entre le CEA et l'Université Joseph Fourier. Un bâtiment est prévu sur le site du CEA et un autre sur le campus à St Martin d'Hères.

Nanotec 300 Plate-forme 300 mm commune au CEA-Léti, STMicroelectronics, Philips et Freescale

Nexus Association européenne de microsystèmes. Finance des projets et des études sur fonds de la Commission Européenne.

OMNT Observatoire des Micro et Nano Technologies

OURIP Observatoire Universitaire Régional de l'Insertion Professionnelle de l'Académie de Grenoble

RMNT Réseau des Micro et Nano Technologies

RTB Recherche Technologique de Base

SELETE Semiconductor Leading Edge Technology, consortium japonais fondé en 1996 pour promouvoir l'introduction du 300 mm dans l'industrie microélectronique japonaise. A permis le développement du nœud 65 nm (longueur de grille de 65 nm). Transfert aux 10 entreprises impliquées terminé en mars 2006. Travail maintenant sur les principales technologies propres à arriver aux nœuds 45 et 32 au sein d'un regroupement des efforts industriels et académiques centrés sur le centre de Tsukuba.

SEMATECH SEmiconductor MAnufacturing TECHnology, regroupement industrie-

Gouvernement US crée en 1987 pour faire face à la montée de l'industrie japonaise du semi-conducteur et notamment des mémoires. Les entreprises impliquées dans Sematech représentent actuellement 50% du marché du semi-conducteur mondial.

Superconducteur

Terme anglais pour supraconducteur en français. C'est un conducteur électrique qui ne présente pas de résistance électrique. Dans un tel conducteur, le courant circule sans perte, donc sans d'échauffement. Actuellement les supraconducteurs sont peu exploités en microtechnologies sauf pour des composants particuliers

comme les détecteurs de courants par effet Hall (effet magnétique) ou de champ magnétique (composant SQUID).

Techniques de projection d'un seul électron (E-beam)

L'e-beam consiste à remplacer la lumière par des électrons pour dessiner des motifs dans une résine. Les électrons ayant une longueur d'onde nettement plus petite que la lumière, il était espéré un remplacement de cette dernière. Malgré tout, il est nettement plus difficile de contrôler les électrons (particules chargées possédant une masse).

UJF Université Joseph-Fourier

VLSI Intégration à très grande échelle

ZHT Zone de Haute Technologie

Bibliographie

ABERNATHY, W.J. et CLARK, K.B. Mapping the Wind of Creative Destruction. *Research Policy*, 1985, 14, p.3-32

ABRAHAMSON, E. Managerial fads and fashions: The diffusion-and rejection of innovations. *Academy of Management Review*. 1991, 16: 586-612

AEPI. *Guide des laboratoires*, 2002, 36p.,disponible sur internet http://www.grenoble-universites.fr/servlet/com.univ.utils.LectureFichierJoint?CODE=1063120392148&LANGUE=0

AEPI. *Guide des ressources technologiques du Sillon alpin – l'offre des laboratoires publics en direction des entreprises*, 2004, 29p., disponible sur internet http://archives.grenoble-isere.com/sillon-alpin/Guide-Ressources-Techno.doc

AGRAWAL A., et I. COCKBURN. The anchor tenant hypothesis: exploring the role of large, local, R&D-intensive firms in regional innovation systems. *International Journal of Industrial Organization*, 2003, 21, p.1227–1253

ALDRICH, H. E. et FIOL M. C., Fools rush In: The institutional context of industry creation. *Academy of Management Review*, 1994, 19, p.645-670

American Heritage® Dictionary, 4th Edition, Boston: Houghton Mifflin, 2000; New York: Bartleby.com,

AMIS, J., SLACK T. et HININGS C.R. Pace, sequence and linearity in radical strategic change. *Academy of Management Journal,* 2004, 47(1), p.15-39

ANAND N., et WATSON M. R. Tournament rituals in the evolution of fields: The case of the Grammy Awards. *Academy of Management Journal*, 2004, 47, p.59-80

BALLU Y. *De Mélusine à Minatec, 1956-2006 50 ans d'histoires du CENG devenu CEA Grenoble*, Le Dauphiné Libéré. 2006, 192p.

BECATTINI G. Le District marshallien : une notion socio-économique. *Les régions qui gagnent. Districts et réseaux: les nouveaux paradigmes de la géographie économique* par BENKO, G. ET LIPIETZ, A. Paris : PUF, 1992, p.35-55

BECKER, H.S. *Outsiders, -studies in the sociology of deviance*. Free, New York, 1997, 215p.

BECKERT, J. Agency, entrepreneurs, and institutional change: The role of strategic choice and institutionalized practices in organizations'. *Organization Studies,* 1999, 20(5), p.777-799.

BELUSSI, F. Local production systems/industrial districts as hyper-networks: a post-Marshallian interpretative frame, paper presented at the *EAPE Conference*, Siena November 8th – 11th 2001

BENGHOZI, P-J. et LICOPPE, C. Technological National Learning: From Minitel to Internet. Chapitre rédigé dans le cadre du *Global Internet Economy Project*. 2001, 44p.

BERGER, P.L. ET LUCKMANN, T. *The social construction of reality: A treatise in the sociology of knowledge*. New York Anchor Books, 1967, 240p.

BLANC, C. *Pour un écosystème de la croissance - Rapport au Premier Ministre,* Assemblée Nationale, 2005, 81p., disponible sur internet http://www.ecosysteme-croissance.com/rapport/

BONACCORSI. A. Search regimes and the industrial dynamics of science, 2004, 38p., text presented at the *first PRIME NoE* conference, Manchester

BOXENBAUM, E. et BATTILANA, J. 200, The Innovative Capacity of Institutional Entrepreneurs: A Reconstruction of Corporate Social Responsibility. Paper Presented at the *Academy of Management Annual Conference Perspectives on Institutional Entrepreneurship*, New Orleans, August 6-11, 2004, p39

BOWER, J.L. et CHRISTENSEN, C.M. Disruptive Technologies: Catching the Wave. *Harvard Business Review*, 1995, Jan.-Feb., p.43-53.

BRETON, P., 2000, *La Parole manipulée*, Paris : La Découverte/Poche., 215p.

BRETON, P., et GAUTHIER G. *Histoire des théories de l'argumentation*. Paris : La Découverte/ Repères & Syros, 2000

BROUSSEAU, E. Contrats et comportements coopératifs : le cas des relations interentreprises. *Coopération entre les entreprises et organisation industrielle* par RAVIX, J.L. (sld). Paris : Editions du CNRS Collection Recherche et Entreprise, 1996, p.23-51

CALLON, M. et LAW J. Engineering and Sociology dans a Military Aircraft Project : a Network Analysis of Technological Change, *Social Problems*, 1988, 35 (3), p.284-297

CALLON, M. Le réseau comme forme émergente et comme modalité de coordination : les cas des interactions stratégiques entre firmes industrielles et laboratoires académiques. *Réseaux et coordination* par CALLON, M., COHENDET, P., CURIEN, N. et al. (ed). Paris : Economica, 1999, p.13-64

CALLON, M. *Some Elements of a Sociology of Translation : Domestication of the Scallops and the Fishermen of St. Brieuc Bay*. dans *Power, Action and Belief: A New Sociology of Knowledge?,* in John Law, ed. London: Routledge and Kegan Paul, 1986, p.196-229.

CALLON, M. Réseaux technico-économiques et irréversibilité, dans *Figures de l'irréversibilité en économie*. BOYER, R. (Ed). Paris : édition de l'EHESS, 1991, p.195-230

CALLON M., LATOUR B. Unscrewing the Big Leviathan ; or How Actors Macrostructure Reality and How Sociologists Help Them To Do So? in CICOUREL KKAA. (ed.), *Advances in Social Theory and Methodology : Toward an Integration of Micro and Macro-Sociologies*, London, Routledge an Kegan Paul, 1981

CARLUER, F. Trois cas archétypes de polarisation spatio-productive: le district industriel, le milieu innovateur et la technopole. *Revue d'Economie Régionale et Urbaine*, 1999, numéro 3, p.567-590

CEA GRENOBLE. *MINATEC : 1er pôle européen des micro et nanotechnologies*, document de presse remis lors de l'inauguration de Minatec, 2006, p.31

CEA-GRENOBLE. *Chronique du CEA-Grenoble*, 2002, numéro 71

CHANDLER, A.D. Organizational Capabilities and the Economic History of the Industrial Enterprise. *Journal of Economic Perspectives*, 1992, Vol.6 (3), p.79-100

CHARTIER, I. METIS a joined research initiative between a group of Textile and Paper industries and CEA research center, 2006, 11p., présentation au *pHealth Lucerne*,30 January 2006

CHICOINEAU, L. 50 ans d'informatique à Grenoble... et l'aventure continue. 2004, Document disponible sur http://interstices.info/display.jsp?id=c_5763

CHRISTENSEN, C. M. *The Innovator's Dilemma*. Cambridge, MA: Harvard Business School Press, 1997

CLEMENS, E.S. et COOK, J. Politics and institutionalism: explaining durability and change. *Annual Review of Sociology,* 1999, *25*, 441-466

COMITE INTERMINISTERIEL D'AMENAGEMENT ET DE DEVELOPPEMENT DU TERRITOIRE (CIADT). *Dossier de presse sur les pôles de compétitivité*. 2005, 47p

COMITE INTERMINISTERIEL D'AMENAGEMENT ET DE DEVELOPPEMENT DU TERRITOIRE (CIADT). L*es pôles de compétitivité : cap sur l'innovation et sur la performance des territoires*. 2005, 47p

COLARELLI O'CONNOR, G. et RICE, M. Opportunity recognition and breakthroughinnovation in large established forms. *California Management Review*, 2001, 43 (2): p.95-116

CONGER, J. A. Qualitative Research as the cornerstone methodology for understanding leadership. *Leadership Quarterly*, Spring 1998, Volume 9 (1): p.107-121

COOKE, P. Regional innovation systems: competitive regulation in the new Europe. *GeoForum*,1992, 23, p.365-382

COURLET C. AND PECQUEUR B. *Les systèmes industriels localisés en France: un nouveau modèle de développement*, in: BENKO G. AND LIPIETZ A. *Les régions qui gagnent.*

Districts et réseaux: les nouveaux paradigmes de la géographie économique, 1992, Paris PUF

CREED, D. W. E., SCULLY, M. A. et AUSTIN J. R. Clothes make the person? The tailoring of legitimating accounts and the social construction of identity. *Organization Science*, 2002, 13(5), p.475-496

DACIN, T. M., GOODSTEIN, J. et SCOTT, W. R. Institutional theory and institutional change: Introduction to the special research forum. *Academy of Management Journal,* 2002, 45(1), p.45-56

DAVID, P. A. Clio and the economics of QWERTY. *American Economic Review*, 1985, 75: 332-7

DEETZ, S. et MUMBY, D. K. Power, Discourse, and the Workplace: Reclaiming theCritical Tradition., 1990, in ANDERSON, J. (Ed.), *Communication Yearbook* 13 (p.18-47). Newbury Park, CA: Sage. Reprinted in HARDY, C. (Ed.), Power and Politics in Organizations. in *The International Library of Management*. Aldershot, UK: Dartmouth Publishing, 1995

DÉJEAN, F., GOND J-P, et LECA B.Measuring the unmeasured: An institutional entrepreneur's strategy in an emerging industry. *Human Relations*, 2004, 57/6, p.741-764.

DELEMARLE, A. An empirical approach towards cluster institutionalization - links between external recognition, cluster dynamics and sustainability, Poster présenté lors de la conférence PRIME-US à Atlanta, 2006

DELEMARLE, A. Rationale for public intervention in disruptive S&T as a trust-supporter mechanism in the process of credibility- building of a long-term option, Science and Public Policy (accepted), 2007

DELEMARLE, A. et LAREDO P. Rationales underlying the adoption of a new policy instrument: the case of French "pôles de compétitivité". Article présenté à lors du séminaire EPOM organisé à L'IPTS de Séville, 2005, 13p.

DELEMARLE, A. et LAREDO, P. Breakthrough innovation and the shaping of new markets: the role of communities of practice. Article présenté lors de la conférence DIME "Communities of Practice" in Durham et à la conférence DIME à Manchester, 2005, 15p.

DEMIL, B. et BENSEDRINE, J., Process of legitimation and pressure toward Processes of legitimisation and pressure toward regulation, 2005

DEVRESSE, M.S. Trois usages instrumentaux de la notion de confiance dans l'institution pénale. *Des Mondes de Confiance* par THUDEROZ, C. et MANGEMATIN, V. (eds)., 2003, p.89-97

DIMAGGIO, P. J. Interest and agency in institutional theory. *Institutional patterns and organizations* par ZUCKER, L. (ed). Cambridge MA: Ballinger, 1988, p.3-22

DIMAGGIO, P. J. Constructing an organizational field as a professional project : U.S. Art Museums 1920-1940. *The New Institutionalism in Organizational Analysis* par POWELL, W. W. et DIMAGGIO, P. J. (eds),. Chicago: Chicago University Press, 1991, p.267-292

DIMAGGIO, P.J. et POWELL, W.W. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Revue, 1983,* 48, p.147-160

DORADO, S. Institutional Entrepreneurship, Partaking and Convening. *Organization Studies*, 2005, 26(3), p.385-414

DOSI, G. Technological Paradigms and Technological Trajectories, *Research Policy*, 1982, 11, p.147-162

DUNFORD, M. Grenoble and Central Scotland's regional electronics industries. *Research papers in geography*, 1988, 18, p.68

DURAND, R., et MCGUIRE, J. Legitimating agencies facing selection: The case of the AACSB. *Organization Studies*, 2005, 26(2), p.113-142

EDQUIST, C. *Systems of Innovation: Technologies, Institutions and Organizations.* (Science, Technology and the International Political Economy Series) (Paperback), Routledge, 1997, 426p.

ERVAJEC, K. 'Beyond advertising and journalism: hybrid promotional news discourse'. *Discourse and Society* , 2004, 15/5, p.553-578

FERNANDEZ, J.L. Amateurs de vin et critiques vinicoles : Construction et transformations d'une relation de confiance. *Des Mondes de Confiance p*ar THUDEROZ, C. et MANGEMATIN, V. (eds). Paris : édition du CNRS, 2003,.p132-141

FLIGSTEIN, N. Social skill and institutional theory. *American Behavioral Scientist* , 1997, 40(4), p397-405

FLIGSTEIN, N. Social Skills. *Sociological Theory.* 2001, 19(2), p105-125.

FLIGSTEIN, N. et MARA-DRITA, I. How to Make a Market: Reflections on the Attempt to Create a Single Market in the European Union'. *American Journal of Sociology*, 1996, 102, p.1-33.

FROMHOLD EISEBITH, M. et EISEBITH, G. How to institutionalize innovative clusters? Comparing explicit top-down and implicit bottom-up approaches, *Research Policy*, 2005, 34, p.1250-1268

FUJIMURA, J.H. The Molecular Biological Bandwagon in Cancer Research: Where Social Worlds Meet, *Social Problems*, 1992, 35 (3), p.261-283

GARUD, R., JAIN, S. et KUMARASWAMY, A. Orchestrating institutional processes for technology sponsorship: The case of Sun Microsystems and Java. *Academy of Management Journal*, 2002, 45, p.196-214

GARUD, R. et KARNØE P. (eds) Path Dependence and Creation. Mahwah, NJ: Lawrence Elbaum Associates. 2001, 399p.

GERGEN, K. J. et McNAMEE, S. From Disordering Discourse to Transformative Dialogue. *The Construction of Disorder* par NEIMEYER et RASKIN J.D. (Eds.) APA Press, 2000

GIDDENS, A. *The Constitution of Society: Outline of the Theory of Structuration.* Berkeley CA: University of California Press, 1984

GIDDENS, A. *Central Problems in Social Theory*, University of California press, 1979

GILLY, J.P. Innovation et Territoire: pour une approche méso-économique des technopoles*, Revue d'Economie Régionale et Urbaine*, 1987, 5, pp 785-795

GIOIA, D. A. et CHITTIPEDDI, K. Sensemaking and Sensegiving in Strategic Change Initiation. *Strategic Management Journal*, 1991, 12, p.433-448.

GOMEZ,P.Y, KORINE H. et MASCLEF O., 2003, Alliance stratégique et construction de la confiance :Le cas Renault – Nissan. *Des Mondes de Confiance* par THUDEROZ, C. et MANGEMATIN, V. (eds). Paris : édition du CNRS, 2003, p.142-154

GRANT, D., HARDY, C., OSWICK, C. et PUTMAN, L. *The handbook of organizational discourse*. London: Sage, 2004

GRANT, D., KEENOY, T., et OSWICK, C. Organizational discourse: Key contributions and challenges. *International Studies of Management and Organization*, 2001,l.31 (3), p.6-24.

GREENWOOD, R., SUDDABY, R., et HININGS, C. R. Theorizing change: The role of professional associations in the transformation of institutionalized fields. *Academy of Management Journal,* 2002, 45/1, p.58-80

HARDY, C. Researching organizational discourse. *International Studies of Management and Organization,* 2001, 31(3), p.25–47

HARDY, C., et PHILLIPS, N. No joking matter: Discursive struggle in the Canadian refugee system. *Organization Studies,* 1999, 20/1, p.1-24

HARGADON, *A. How Breakthroughs Happen*. Cambridge, MA: HBS Press, 2004

HARGADON, A., et DOUGLAS, Y. When innovations meet institutions: Edison and the design of electric light. *Administrative Science Quarterly*, 2001, 46, p.476-501

HARGRAVE, T.J et VAN DE VEN, A.H. A Collective Action Model of Institutional Innovation. *Academy of Management Review,* 2006, Vol. 31, No. 4, 864–888.

HAVEMAN, H. et RAO, H. Structuring a theory of moral sentiments: institutional and organizational coevolution in the early thrift industry. *American Journal of Sociology,* 1997, 102/6, p.1606-1651

HOLM, P. The dynamics of institutionalization: Transformation processes in Norwegian fisheries. *Administrative Science Quarterly, 1995*, 40(3), p.398-422.

JEPPERSON, R. Institutions, institutional effects, and institutionalism. par W. Powell, et P. DiMaggio (Eds.), *The new institutionalism in organizational analysis*. Chicago: University of Chicago Press, 1991.

KAHANE, B. *La "narraction" comme mode d'élaboration de la stratégie en situation d'incertitude: Le cas de la thérapie génique et des "Innovations technologiques de rupture"*, HEC, Thèse de doctorat ès-Sciences de Gestion, Paris, 2000

KAHANE, B. Les conditions de cohérence des récits stratégiques: De la narration à la narraction. *Revue Française de Gestion*, 2005, 159, p.125-147

KUHN, T. S. *La structure de la révolution scientifique.* Paris, 1972

LACHMANN H. *Dossier de candidature Pôle de compétitivité – Minalogic Les solutions miniaturisées intelligentes.* 2005, 216p.

LAREDO, P. et al. *Socrobust Final Report*. Ecole de Mines, 2002

LAREDO, P. et DELEMARLE, A. Management practices in non-mainstream contexts - ATBEST Deliverable 3. in Rip et al. "*Assessment Tools for New and Emerging Science and Technology" (ATBEST) Final Activity Report*. NEST-SSA 508929, 2005

LATOUR, B. *Science in Action, How to Follow Scientists and Engineers through Society.* Harvard University Press (US) / Open University Press (GB), 1987

LATOUR, B. *La vie de laboratoire.* Paris, La Découverte, 1988

LATOUR, B. *Aramis, ou l'amour des techniques.* Paris La Découverte, 1992.

LATOUR, B. *Les limites de l'expérience collective*. La Recherche, 1998, 306p.

LATOUR, B. et WOOLGAR, S.W. *Laboratory Life*. Sage, London and Beverly Hills, 1979

LATOUR, B. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford University Press, UK, 2005

LAWRENCE, T. B. et PHILLIPS, N. From Moby Dick to Free Willy: Macro-cultural discourse and institutional entrepreneurship in emerging institutional fields. *Organization*, 2004, 11(5), p.689-711

LAWRENCE, T. B. et SUDDABY, R. Institutions and Institutional Work. *Handbook of Organization Studies, 2nd Edition,* 2006

LAWRENCE, T. B. Institutional strategy. *Journal of Management, 1999,* 25(2), p.161-188

LAWRENCE, T. B., HARDY, C. et PHILLIPS, N. Institutional effects of interorganizational collaboration: The emergence of proto-institutions. *Academy of Management Journal,* 2002, 45/1, p.281-290

LAWRENCE, T. B., MAUWS, M. K., DYCK, B. et KLEYSEN, R. F. The politics of organizational learning: Integrating power into the 4I Framework. *Academy of Management Review*, 2005, 30/1, p.180-191

LEBLEBICI, H., SALANCIK, G. R., COPAY, A. et KING, T. Institutional change and the transformation of interorganizational fields: An organizational history of the U.S. radio broadcasting industry. *Administrative Science Quarterly*, 1991, 36/3, p.333-363

LECA, B., BATTILANA, J. et BOXENBAUM, E. Taking Stock on Institutional Entrepreneurship: What do we know? Where do we go? Paper presented at the *Academy of Management*, August 5-10, 2005 Honolulu

LECA, B., GOND, JP., DÉJEAN, F. ET HUAULT I. Institutional Entrepreneurs as Translators: A Comparative Study in the Emerging Activity of Corporate Social Evaluation in France ", *Academy of Management*, 2006, Div OMT, Atlanta

LOK, J. et WILLMOTT, H. Institutional Theory, Language, and Discourse Analysis: A Comment on Phillips, Lawrence, and Hardy. A*cademy of Management Review,* 2006, 31(2), p.477-488

LORENZ, E. Que savons-nous à propos de la confiance ? Un tour d'horizon des contributions récentes. *Des Mondes de Confiance* par THUDEROZ, C. et MANGEMATIN, V. (eds). Paris : édition du CNRS, 2003, p.77-83

LOUNSBURY, M. Institutional Transformation and Status Mobility: The Professionalization of the Field of Finance. *Academy of Management Journal,* 2002, 45(1), p.255-66

LOUNSBURY, M. *Towards a practice perspective on institutional entrepreneurship: mutual fund money management change and the performativity*, 2005, 41p.

LURYI, S., XU, J. et ZALASLAVSKY, A. (Eds.). *Future Trends in Microelectronic: The Road Ahead*,.John Wiley & Sons, Inc, 1999

MAGUIRE, S., HARDY, C., et LAWRENCE, T. B. Institutional entrepreneurship in emerging fields: HIV/AIDS treatment advocacy in Canada. *Academy of Management Journal, 2004,* 47(5), p.657-679

MAILLAT D. *Milieux innovateurs et dynamique territoriale, Economie industrielle et économie spatiale*. Paris Economica, 1995, p.211-231

MANGEMATIN, V. Cléopâtre et son goûteur. *Des Mondes de Confiance* par THUDEROZ, C. et MANGEMATIN, V. (eds). Paris : édition du CNRS, 2003, p.84-88

MANGEMATIN, V., RIP, A., DELEMARLE, A. et ROBINSON, D. Emergence of Clusters in Nanotechnologies: The Role of Regional Institutional Entrepreneurs. Article présenté à *EGOS Conference (session 19)*, 6-8 Juillet 2006, Bergen, Norway, 31p

MARSHALL, A. *Principles of Economics,* 1890

MARTIN, R., SUNLEY, P. Deconstructing clusters: chaotic concept or policy panacea? *Journal of Economic Geography*, 2003, 3, p.5-35

MEYER, J.W. et ROWAN, B. Institutional organizations. Formal structure as myth and ceremony. *American Journal of Sociology*, 1977 [1991], 83, p.340-363

MEYER, M. *De la métaphysique à la rhétorique.* Edition de l'Université de Bruxelles,1986

MINTZBERG, H. The manager's job: folklore and fact. *Harvard Business Review*, 68 (2), Mar-Apr 1990, pp163-176

MORET, R. et ROBERT E. *L'ingénieur moteur de l'innovation, un siècle de formation d'ingénieurs à Grenoble*, les éditions des vignes & l'éditeur, 2001

MUMBY, D. et CLAIR, R. Organizational discourse. *Discourse as Structure and Process: Discourse Studies* par VAN DIJK, T.A. (ed), London: Sage, 1997, 2

MUNIR, K. et PHILLIPS, N. The birth of the 'Kodak Moment': Institutional entrepreneurship and the adoption of new technologies. *Organization Studies, 2005,* 26(11), p.1665-1687

MUSTAR, P.et LARÉDO, P. Innovation and Research Policy in France (1980-2000) or the disappearance of the Colbertist State. *Research Policy*, 2002, 31 (1), p.55-72

NORTH, D. C. *Institutions, Institutional Change and Economic Performance*. Cambridge (Ma.) Cambridge University Press, 1990

OGATA, K. The Persistence of Delegitimated Structures: Insights from the Meiji Restoration and the Last Samurai, Paper presented at the *22nd EGOS Colloquim (session 19)*, 2006, 26p

OLIVER, C. Strategic Responses to Institutional Processes. *Academy of Management Review*. 1991 Vol. 16: 145–179.

OLIVER, C. The antecedents of deinstitutionalization. *Organization Studies*, 1992, 13, p.563-588.

OST. *Indicateurs de sciences et de technologies*. Paris, Economica, 2004

OURIP. Communication personnelle par email, 2005.

PARBOTEEAH et al. Social Institutions and Sanctioned Behaviors: A Cross-National Study. *International Journal of Comparative Sociology,* 2003; 44, p.239-265

PERELMAN, C. et OLBRECHTS-TYTECA, L. *Traité de l'argumentation, la nouvelle rhétorique.* Editions de l'Université de Buxelles, 1970

PHILLIPS, N, LAWRENCE T.B. et HARDY C, Inter-organizational collaboration and the dynamics of institutional fields. *Journal of Management Studies*, 2002, 37/1, p.23-44

PHILLIPS, N, LAWRENCE T.B. et HARDY C. Discourse and institutions. *Academy of Management Review*, 2004, 29/4, p.635-652.

PORTER, M. *The Competitive Advantage of Nations*, New York The Free Press,1990

PORTER, M. *On Competition*, Boston Harvard Business School Press, 1998

POWELL, W. et DIMAGGIO P. (Eds.), *The new institutionalism in organizational analysis*. Chicago: University of Chicago Press, 1991.

RAO, H. The social construction of reputation: Certification contests, legitimation, and the survival of organizations in the American automobile industry: 1895-1912. *Strategic Management Journal,* 1994, 15, p.29-44

RAO, H. Caveat emptor: The construction of nonprofit consumer watchdog organizations. *American Journal of Sociology,* 1998, 103/4, p.912-961

RAO, H., MONIN, P., et DURAND R. Institutional Change in Toque Ville: Nouvelle Cuisine as an Identity Movement in French Gastronomy. *American Journal of Sociology*, 2003, 108 (4): 795–843

RAO, H., MORRILL C., et ZALD M.N. Power plays: How social movements and collective action create new organizational forms. *Research in Organizational Behavior, 2000,* 22, p.239-282

REVOL, M., GOLLIAU, C., HOUDART, P., JARRIGE, A.S. et PUJAS, S. Palmarès 2004 des écoles d'ingénieurs. *LePoint.fr*. Document disponible sur www.lepoint.fr/management/1635/document.html?did=140887

RIP, A. Controversies as Informal Technology Assessment. *Knowledge,* 1986, 8(2), December, p.349-371

SACKS, H. Notes on Methodology. *Structures of Social Action: Studies in Conversation Analysis* par ATKINSON, J. M. et HERITAGE, J. (eds.). Cambridge University Press, Cambridge UK, 1984

SACKS, H., SCHEGLOFF, E.A. et JEFFERSON, G. A simplest Syetmatics for the Organization of Turn-Taking for conversation. *Studies in the Organisation of Conversational Interaction* par SCHENKEIN, J. (ed.). New York Academy Press, New York, USA, 1978

SAXENIAN A. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128.* Harvard University Press, Cambridge, 1994

SCHEGLOFF, E.A. *Sequencing in Conversational Openings.American Anthropologist*. 1968, 70, p.1075-1095

SCHEGLOFF, E.A. Turn Organization: One Intersection of Grammar and Interaction. *Interaction and Grammar* par OCHS, E., SCHEGLOFF, E.A. et THOMPSON, S.A. (eds.). Cambridge University Press. Cambridge, UK, 1996

SCHEGLOFF, E.A., JEFFERSON, G., et SACKS, H. The Preference for Self-correction in the Organization of Repair in Conversation. *Language*, 1977, 53, p.361-382

SCHEGLOFF, E.A. The Relevance of Repair for Synthax-for-Conversation. *Syntax and Semantics 12: Discourse and Syntax* par T. Givon,T. ed. New York Academic Press. New York, USA, 1979

SCOTT, W.R. Institutional theory. *Encyclopedia of Social Theory*, RITZER, G. (ed.). Thousand Oaks, CA: Sage, 2004, p.408-414

SCOTT, W. R. *Institutions and Organizations*. Thousand Oaks, CA, Sage, 1995 and 2001

SEO, M.-G., et CREED, W.E.D. Institutional contradictions, praxis, and institutional change: a dialectical perspective. *Academy of Management Review*, 2002, *27(2),* 222-247

SNOW, D. A., et BENFORD, R. D. *Master frames and cycles of protest*. dans MORRIS et MUELLER (Eds.) Frontiers in Social Movement Theory. New Haven: Yale University Press. 1992, pp. 133-155

SNOW, D., ROCHFORD JR.B., WORDEN, S. et BENFORD, R.D. Frame Alignment Processes, Micromobilization, and Movement Participation. *American Sociological Review,* 1986. 51:464–81.

STAR, S. L., et GRIESEMER, J. R. Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, 1989, 19,387-420.

STANKIEWICZ, R. The Concept of 'Design Space. *Technological Innovation as an Evolutionary Process* par ZIMAN, J. (ed.). Cambridge, Cambridge University Press, 2000

STRANG, D. et MEYER, J. Institutional Conditions for Diffusion. *Theory and Society.1993,* 22:487–511.

STRANG, D. et SINE W, D. Interorganizational institutions. *Companion to organizations* par BAUM, J. (ed). Oxford: Blackwell, 2002, p.497-519

SUCHMAN, M.C. Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review,* 1995, 20/3, p.571-610

SUDDABY, R, et GREENWOOD, R. Rhetorical strategies of legitimacy. *Administrative Science Quarterly*, 2005, 50/1, p.35-67

TECHNICATOME S.A. (Coordinateur du projet) PROTEE - Procédures dans les Transports d'Evaluation et de suivi des innovations considérées comme des Expérimentations collectives, Mars 2000 — V5 ; CONTRACT N°ST-97-SC.2093, Project funded by the European Commission under the Transport RTD Programme of the 4th Framework Programme, 2000

THEVENOT, L. Les investissements de forme. *Conventions économiques Cahiers du Centre d'études de l'emploi*, Paris, PUF, 1985

THUDEROZ, C. et MANGEMATIN V. (eds). *Des Mondes de Confiance.* Paris : édition du CNRS, 2003, p.178-184

TOLBERT, P.S. et ZUCKER, L.G. The institutionalization of institutional theory. *Handbook of Organization Studies* par CLEGG, HARDY, et NORD (eds.). Sage, 1996, p.175-190

TROMPETTE, P. De la prudence… à la confiance. *Des Mondes de Confiance* par THUDEROZ, C. et MANGEMATIN, V. (eds). Paris : édition du CNRS, 2003, p.71-76

TUSHMAN, M. ET REILLY, C.A. *Winning Through Innovation. Boston, Mass*. Harvard Business School Press, 1997

VAN DE VEN, A. H. Running in packs to develop knowledge-intensive technologies. *MIS Quarterly*. 2005, 29(2): 365-378.

WADE-BENZONI, K.A., HOFFMAN, A.J., THOMPSON, L.L., MOORE, D.A., GILLESPIE, J.J. et BAZERMAN, M.H. Resolution in ideologically based negotiations: The role of values and institutions. *Academy of Management Review*, 2002, 27/1, p.41- 58

WEICK, K. E. *Sensemaking in organizations*. Thousand Oaks, CA: Sage, 1995

WESSNER, C.W. (ed), , *Securing the Future: Regional and National Programs to Support the Semiconductor Industry*. Washington DC: National Academies Press, 2003, 316p.

WHALEN, J. et RAYMOND, G. Conversation analysis. *The Encyclopedia of Sociology*.par MACMILLAN, N.Y, 2000

WILLIAMSON, O.E. Calculativeness, Trust and Economic Organization. *Journal of Law and Economics*, 1993, 36, p.453-500

YATES, J.A. and ORLIKOWSKI, W. The PowerPoint Presentation and Its Corollaries: How Genres Shape Communicative Action in Organizations. *The Cultural Turn :Communicative Practices in Workplaces and the Professions* par ZACHRY, M. and THRALLS, C.(eds.). Amityville, NY: Baywood Publishing

YIN R. K.. *Case study research: designs and methods* (third edition). Applied Social Research Methods Series, vol. 5. Thousand Oaks, CA: Sage Publications, 2003

ZILBER, T.B. Institutionalization as an interplay between actions, meanings and actors: The case of a rape crisis center in Israel. *Academy of Management Journal*, 2002, 45/1, p.234-254

ZIMMERMAN, M. A. et ZEITZ G. J. Beyond survival: Achieving new venture growth by building legitimacy. *Academy of Management Review,* 2002, 27/3, p.414-431

Zucker, L. G. Organizations as institutions. In Bacharach (Ed.), *Research in the sociology of organizations*, 1983, 2: 1-47. Greenwich, CT: JAI Press.

Liens internet

AEPI, http://www.grenoble-isere.com/101-metis.htm
AEPI, http://www.grenoble-isere.com/101-metis.htm
AEPI, http://www.grenoble-isere.com/101-metis.htm
Classement des Universités de Shanghai, http://ed.sjtu.edu.cn/rank/2003/2003main.htm
ENSIEG, http://www.ensieg.inpg.fr/86484676/0/fiche___pagelibre/)
Gouverneur de NYC, http://www.gorr.state.ny.us/01_28_03_sematech.htm
Ideas'Lab, www.ideas-laboratory.com
IdNano, http://www-idnano.ujf-grenoble.fr/idnanopresentation.htm
INSEE, La population de l'Isère est globalement plus éduquée que la moyenne nationale pour toutes les populations d'âge http://www.insee.fr/fr/ffc/accueil_ffc.asp
Interstices, http://interstices.info/display.jsp?id=c_5763
Le Point.fr www.lepoint.fr/management/1635/document.html?did=140887
Minatec, http:// www.Minatec.com
Nanotechnology Research Institute, http://www.nanoworld.jp/apnw/articles/japan.php
Pôle de compétitivité, www.competitivite.gouv.fr
Small Times Magazine, http://www.smalltimes.com
Techno-science.net, http://www.techno-science.net/?onglet=news&news=1839
Trésor de la Langue Française, 2006, http://atilf.atilf.fr/tlf.htm
Trésor de la Langue Française, 2006, http://atilf.atilf.fr/tlf.htm
UCLA News, http://newsroom.ucla.edu/page.asp?RelNum=4601&menu=fullsearchresults
ZIRST, http://www.zirst.com